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***551 IS ELECTROCUTION AN UNCONSTITUTIONAL METHOD OF EXECUTION? THE
ENGINEERING OF DEATH OVER THE CENTURY**

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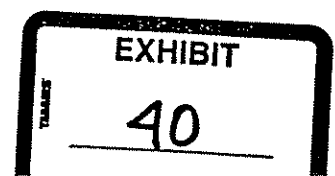
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***554 INTRODUCTION**

On May 4, 1990, at 7:13 a.m., Jesse Joseph Tafero became the 219th person to die in Florida's electric chair. [FN1] His execution was "gruesome." [FN2] For four minutes, the hooded executioner applied three 2,000-volt jolts of electricity to Tafero's body. [FN3] Until the last jolt Tafero "continued to clench his fists, nod, convulse and appear to breathe deeply ... as if he were alive." [FN4] Tafero's execution was particularly controversial because the jolts sparked a fire on his *555 head with six- to twelve-inch flames [FN5] that filled the execution chamber with smoke. [FN6] The fire also caused ashes, [FN7] "flames and smoke clouds to fly from [Tafero's bobbing] head during each of the three surges" [FN8] while "his throat produced gurgling sounds." [FN9]

Witnesses and reporters were shocked by the incident, [FN10] which created statewide headlines the next day. [FN11] There were varying explanations for why the fire occurred, and why the first jolt failed to kill as intended. [FN12] Some experts said that the synthetic sponge in Tafero's headset did not properly conduct electricity and burst into flames with each jolt. [FN13] Another expert testified that the head and leg electrodes were in "questionable" condition because Florida's superintendent of prisons had rejected new equipment considered to be too costly. [FN14] The expert declined the superintendent's subsequent request that he create a leg electrode from an old army *556 boot and a copper strip. [FN15] Still others suggested that an impaired electrode reduced the current from 2,000 to 100 volts, [FN16] "low enough ... to keep a person alive and in great pain." [FN17] The medical examiner who conducted Tafero's autopsy said he could not determine whether Tafero survived the first two jolts or died instantly, [FN18] as a prison doctor had contended. [FN19]

Tafero's execution was not unique. It paralleled the "botched" electrocution of William Kemmler [FN20] who, a century earlier, was the first person electrocuted in this country. [FN21] In *In re Kemmler*, [FN22] the Supreme Court refused to decide Kemmler's claim that the use of electrocution to inflict death was cruel and unusual punishment under the Eighth Amendment. [FN23] It held that the Eighth Amendment *557 [FN24] did not apply to the states and therefore left unexamined the New York state legislature's conclusion that electrocution produced " 'instantaneous, and, therefore, painless death.' " [FN25]

Electrocution has been used in the great majority of executions in this century. [FN26] Today, it is second only to lethal injection as the preferred method of execution. [FN27] Even though Kemmler never decided whether electrocution was cruel and unusual punishment, and the Court subsequently held that the Eighth Amendment applies to the states, [FN28] courts have continued to rely on Kemmler for the proposition that a wide range of capital punishments, most particularly electrocution, are permissible. [FN29] Consequently, electrocution never has been scrutinized under modern Eighth Amendment standards. This circumstance persists despite substantial evidence that death by electrocution may inflict "unnecessary pain," "physical violence," and "mutilation," [FN30] rather than the "mere extinguishment of life" referred to in Kemmler. [FN31]

This Article provides the Eighth Amendment analysis of electrocution that the courts thus far have not approached. The analysis has two parts. The first inquires whether, according to available *558 scientific evidence, electrocution amounts to cruel and unusual punishment even if it is administered as planned. The second inquires whether, in light of the frequency with which electrocutions are botched, continuing the practice amounts to cruel and unusual punishment even if the properly administered electrocution would not. [FN32]

These inquiries are timely. In 1993, three Supreme Court Justices indicated their interest in deciding the issue of the constitutionality of electrocution. [FN33] Moreover, these Justices concluded that Kemmler is not dispositive in light of the modern evidence available on electrocution's effects. [FN34] At the same time, the Ninth Circuit Court of Appeals has called for an evidentiary hearing to determine whether hanging is cruel and unusual punishment under the Eighth Amendment. [FN35] The Ninth Circuit's decision is of particular interest in this Article because the New York state legislature originally sought electrocution in order to replace the cruelties associated with hanging. [FN36]

In light of these recent developments, Part I of this Article examines the philosophical, financial, and political

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forces preceding Kemmler. Part II analyzes the credibility and consequences of Kemmler, as well as the reasons for Kemmler's botched execution. Part III discusses the Supreme Court's evolving execution jurisprudence *559 and Kemmler's precedential force on 226 cases over the century. Part III also notes that courts have relied on Kemmler as constitutional support for all methods of execution as well as general Eighth Amendment propositions. Part IV evaluates the constitutionality of electrocution, providing the most thorough examination available of recent scientific and eyewitness evidence, as well as the means by which electric chairs are made and applied. Part IV ends with an account of the rise and fall of Fred A. Leuchter, also known as "Dr. Death," formerly the primary manufacturer of execution equipment in this country. Part V describes eleven major botched electrocutions that have occurred since the death penalty was reinstated. Part VI suggests that electrocution does not appear to be a more humane execution method than hanging or shooting, the methods it was created to displace, and questions whether Kemmler warrants any further credibility.

This Article concludes that claims that electrocution, if properly administered, provides "instantaneous and therefore painless" death are contradicted by substantial evidence demonstrating that it may inflict unnecessary pain, physical violence, and mutilation. Moreover, even if a properly administered electrocution should not be considered unconstitutional, the practice amounts to cruel and unusual punishment because of the frequency with which electrocutions are, and likely will continue to be, botched. The fact that courts have continued to turn a wilfully blind eye toward states' use of electrocution in light of the century-long evidence of its cruelty, negligent application, and insupportable case law, constitutes a great judicial and legislative scandal.

I. KEMMLER'S HISTORICAL FOUNDATIONS

This Part examines the philosophical, financial, and political forces preceding Kemmler's first trial, [FN37] its appellate phases, [FN38] and *560 the Supreme Court's final ruling. [FN39] The Part begins with a brief history of the Eighth Amendment's Cruel and Unusual Punishments Clause as a backdrop for discussing two topics: the development of the anti-capital punishment movement in New York State, and New York's eventual adoption of a cruel and unusual punishments clause with wording nearly identical to the Eighth Amendment. The Part then describes the financial and political forces behind the "battle of the currents" that prompted New York's statutory enactment of electrocution as the "most humane and practical" method of execution.

A. The Eighth Amendment's Concept of "Cruel and Unusual"

One principle underlying the Eighth Amendment's prohibition against excessive punishment first appeared in the Old Testament of the Bible in Exodus. [FN40] Among the laws that Yahweh, the God of the Jewish nation, gave to Moses was the *lex talionis*, an eye for an eye, a tooth for a tooth. [FN41] The *lex talionis* standard designated a maximum limit on punishment; the root *talio* is Latin for "equivalent to" or "equal." [FN42]

A regard for proportionality between crimes and punishments also was evident in early Greek philosophy and in the laws of the Angles and the Saxons of pre-Norman England. [FN43] The concept was presented most forcefully next in Chapter Fourteen of the Magna Carta, which was to be highly influential in the development of *561 English law during the subsequent four centuries. [FN44] Thus, prior to England's adoption of the Bill of Rights in 1689, the English had developed a firm common law prohibition against excessive punishment which was reflected in the country's law reports and charters. [FN45]

The English Bill of Rights of 1689 later was to become the foundation for a provision of the Virginia Declaration of Rights of 1776. In turn, the Virginia Declaration of Rights was incorporated nearly verbatim into the Eighth Amendment. [FN46] Although the English Bill of Rights was designed to control the discretion of English judges in enforcing excessive bail, fines, or punishments under the criminal law, Americans adopted the language in creating their own state and federal constitutions in an effort to curb the imposition of torture or cruel punishments. [FN47] Such limitations were to apply not only to judges but also to legislatures engaged in making the laws that judges would interpret. [FN48]

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At the time that the United States Constitution was ratified, criticisms of its failure to provide protection for convicted criminals spurred the inclusion of the Eighth Amendment into the Bill of Rights. When the Eighth Amendment was debated in the First Congress, though, the Cruel and Unusual Punishments Clause was questioned for fear it would outlaw the then-current criminal punishments of hanging, whipping, and ear cropping. [FN49] These fears eventually were disregarded, however, "precisely because the legislature would otherwise have had the unfettered power to prescribe punishments for crimes." [FN50]

Thus, because the Framers were concerned about the exercise of legislative power, they included in the Bill of Rights a prohibition *562 upon cruel and unusual punishments. Yet the Framers did not define what they considered to be cruel and unusual. No evidence exists suggesting, for example, that they intended to ban only torture or only punishments viewed as cruel and unusual at the time. [FN51]

At the time *Kemmler* was decided, therefore, the Clause was a source of considerable imprecision. [FN52] New York had only limited precedent to follow for determining the meaning of "cruel and unusual" when it adopted the Clause nearly verbatim into its own capital punishment statute. [FN53] Moreover, various political pressures bearing on New York's anti-capital punishment movement aggravated alternative views on the Clause's application.

B. New York's Anti-Capital Punishment Movement [FN54]

Capital punishment originally was introduced into the New York area during the first quarter of the seventeenth century by colonists from Holland who inherited from their homeland, and developed in the New World, a number of capital crimes. [FN55] During that time, capital laws differed widely among the United Provinces, and *563 criminal laws were not codified. The method of capital punishment, which was left to judicial discretion, often included torture or maiming before death by a variety of possible means: hanging, beheading, breaking on the wheel, drowning, burning, and quartering. [FN56]

Capital punishment often was administered brutally in New York under English rule from 1664 to 1776. [FN57] Juries and the clergy, however, mitigated to some degree the application of New York's severe laws. [FN58] As a result, capital punishment was administered less frequently in New York during that time than in England. [FN59] Such willingness to spare criminals from brutality strengthened at the start of the American Revolution and thereafter, making New York a strong force in mitigating criminal punishments during the early history of the United States. [FN60]

Additional social factors influenced New York's impact on capital punishment. In the first four decades of the nineteenth century, for example, the United States, and New York particularly, experienced rapid social and political change, largely due to the influx of immigrants. One of the most significant social conversions was the rise of voluntary societies dedicated to humanitarian causes. [FN61] The causes espoused by these societies included temperance, peace, women's rights, prison reform, and the abolition of the death penalty. [FN62]

New York's increasing opposition to capital punishment in the 1820's and 1830's, however, is most readily understood in terms of *564 the popularity of hangings. In New York and other states, [FN63] hangings resembled "county fairs" that attracted huge crowds of spectators to small towns. [FN64] In 1835, for example, between eight and sixteen thousand people attended one hanging in the small town of Mayville, Chautauqua County. [FN65] In 1827, one crowd was so dense at an execution in Cooperstown that two spectators were killed and many more injured when a viewing stand collapsed. [FN66] The crowds were larger in cities. The execution of Jesse Strang that same year in Albany, for example, drew a crowd estimated at thirty thousand by one source and forty thousand by another. [FN67] Public hangings were also lucrative. Both merchants and homeowners sold food and supplies, or provided admission tickets to areas with the best views. [FN68]

In the 1830's, critical reaction to such events gave rise to New York legislators' repeated requests that the legislature as a whole improve the capital code as well as investigate the possibility of abolishing hanging.

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[FN69] In 1834, for example, New York first evaluated a bill to stop "the vicious assemblages and demoralizing tendencies *565 of public executions." [FN70] Although in 1835 New York legally abolished public hanging, [FN71] such reform both hindered and helped the effort to eliminate all capital punishment. Because hangings were no longer in public view, reformers had less incentive to change the execution system. They were relieved that the government had conceded to at least some of their efforts. [FN72]

During the 1840's, however, New York, like much of the United States, again experienced a surge in attempted reform. This revival was demonstrated in part by the near success of an active and organized anti-gallows campaign led by reform groups around the state, most significantly, the New York State Society for the Abolition of Capital Punishment. [FN73] The Society and the progress of the reform effort peaked in terms of public support during 1846 and 1847. [FN74]

Such progress was dimmed, however, during the late 1840's and the 1850's when the United States struggled with repeated national crises. Ultimately, the country fell into civil war. These crises had an especially devastating effect in New York, one of the most important states in the Union at that time, because of problems unique to the state. [FN75] During this period the influx of immigrants to New York resulted in rapid social change that plagued the state with a rising crime rate and inept city governments. [FN76] In the midst of such turmoil, the drive for reforms such as the anti-gallows movement experienced a gradual decline. [FN77]

As the next Section shows, only several decades later would the reform effort be revitalized. This reform would not abolish capital *566 punishment completely in New York, although such reform efforts did in ten other states. [FN78] Instead, New York's reform would replace hanging with electrocution, an allegedly more humane method of punishment. [FN79] Like earlier efforts toward reforming capital punishment in New York, however, the legalization of electrocution had a significant commercial and political backdrop. It marked the beginning of an age whereby the government relied on scientific experts for designating and creating what was perceived to be the most appropriate method of punishment.

C. The Electrocution Act and the "Battle of the Currents"

In 1885, the Governor of New York announced in his annual message to the legislature that [t]he present mode of executing criminals by hanging has come down to us from the dark ages, and it may well be questioned whether the science of the present day cannot provide a means for taking the life of such as are condemned to die in a less barbarous manner. [FN80]

*567 A year later he appointed a Commission [FN81] ("Commission" or "New York Commission") of three "well-known citizens" [FN82] to "investigate and report to the Legislature ... the most humane and practical method known to modern science of carrying into effect the sentence of death in capital cases" [FN83] (the "Commission Report"). [FN84] The Commission consisted of its Chair, Elbridge T. Gerry, a prominent attorney and counsel for the Society for the Prevention of Cruelty to Animals, Dr. Alfred P. Southwick, a dentist from Buffalo, and Matthew Hale, an attorney from Albany. [FN85] The legislature extended the due date for the Commission Report by one year to ensure that it would be "most thorough." [FN86]

For a variety of reasons described below, the Commission ultimately recommended electrocution as the most humane method of effecting death. [FN87] How this choice came into play, however, illustrates *568 the influence of professional reputation and commercial interests as opposed to any sophisticated scientific knowledge of electrocution.

1. The AC-DC Controversy

The Commission's recommendation to use electricity was prompted by commercial enterprises during what has been termed the "Age of Electricity," which ranged in the United States from 1880-1930. [FN88] The dramatic start of this electrical age occurred in September 1882, when Thomas Edison introduced an era of commercial

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incandescent lighting by illuminating buildings with "direct current" (DC) in approximately one square mile of the commercial and financial district of New York City. [FN89] Although the DC systems that Edison created were considered safe, their low transmission voltages limited their range to just a mile beyond their generators. [FN90] This drawback and the economic rewards of the electric industry spurred attempts to create other methods of transmission. Four years later, George Westinghouse led the development of methods for transmitting electrical energy over long distances by promoting experiments and installations that produced *569 a system of incandescent lighting based on "alternating current" (AC). [FN91]

By the time the New York Commission was appointed, it appeared that Westinghouse's AC system was beginning to have significant financial advantages over Edison's DC system because of AC's lower transmission costs. [FN92] Although Edison attempted to create cost reductions with the DC system, the savings were not comparable. As a result, an intense marketing competition developed between the two men and their electrical systems, creating what has been termed the "battle of the currents." [FN93] This battle over the advantages and disadvantages of the two systems involved not only engineers and scientists, but also lawmakers and the public, in a number of areas important to the future scientific and technological development of the electrical industry. [FN94] One of the most important areas concerned diverging opinions on whether AC was considerably more dangerous than DC. [FN95]

New York State incorporated the battle of the currents into the realm of capital punishment when Southwick, later considered the "father of electrocution," [FN96] suggested the possibility of using electricity as an alternative to hanging. [FN97] Before his appointment to the Commission, Southwick had witnessed what had appeared to be the fast and painless death of a man who had been touched by an electric generator. [FN98] Thereafter, he conducted a number of his *570 own experiments electrocuting animals, [FN99] while also witnessing those conducted by Dr. George E. Fell, [FN100] who later became one of the designers of the first electric chair. [FN101]

In order to convince his fellow Commission members to adopt electrocution, Southwick wrote Edison in November 1887, requesting his opinion on electrocution as an execution method as well as details regarding how it could be administered to ensure certain death. Southwick emphasized how Edison's reputation as a scientist and electrician could promote the use of electricity. [FN102] Indeed, Edison was already an "American hero" [FN103] during an era when professional ambition rapidly was becoming the highest goal an individual could achieve and one of the greatest sources of public acceptance. [FN104]

Initially, Edison was disinterested in Southwick's request, noting that he opposed capital punishment. [FN105] Southwick, however, pursued Edison's support with a second letter in December in which he explained that, because capital punishment would always exist, the sole matter of debate was how it would be carried out. Edison's reputation would assist the New York legislature in selecting a punishment that was more humane than hanging, "a relic of barbarism." [FN106]

*571 Edison finally agreed to help Southwick, it appears, for two primary reasons. First, Edison realized that the link between AC (the type of current he would recommend) and death could diminish considerably consumers' use of AC in their homes and thereby bolster economically the floundering DC enterprise. [FN107] Second, Edison genuinely believed that AC was potentially lethal and, it seems, criticized its use even prior to Westinghouse's financial ascendance. [FN108] Edison thus informed Southwick that a current from the alternating machines manufactured by George Westinghouse could, "even by the slightest contacts, produce[] instantaneous death." [FN109]

Edison's letter significantly influenced Gerry, the Commission's chairman. [FN110] Relying in addition upon the recommendations provided by other electricity experts, the Commission sent a circular to interested parties requesting their views on the "most humane and practical" method of execution, and listing a number of suggested alternatives to hanging. [FN111] These parties included the justices of the New York Supreme Court, county judges, district attorneys, sheriffs, and members of the medical and electrical professions throughout the state.

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[FN112] The listed alternatives included electrocution, the administration of prussic acid or other methods of poison, the guillotine, and the garrote. [FN113] Of the two *572 hundred replies to the circular, eighty-one (40.5%) favored the retention of hanging and 119 (59.5%) advised an alternative. Of the 119 who wanted an alternative, seventy-five (63%) suggested electricity. [FN114]

The Commission's recommendation of electricity was influenced by one other factor. The medical profession strongly opposed the administration of poison because it would require the use of the hypodermic needle. [FN115] Utilizing "the practice of medicine ... for the purpose of putting criminals to death would arouse the unanimous protest of the medical profession," asserted a Philadelphia *573 physician. [FN116] Thus, lethal injection failed to become a serious alternative for execution at this time.

2. The Commission Recommends Electricity

In its January 1888 Report to the New York legislature, the Commission recommended the use of electrocution over hanging as a method of execution without, however, specifying the type of current to be applied. [FN117] On June 4, 1888, with little opposition, the legislature enacted New York's Electrical Execution Act [FN118] ("Electrocution Act" or the "Act"). Under the Electrocution Act, anyone convicted of a capital crime after January 1, 1889, would be electrocuted rather than hanged. [FN119] "The punishment of death must, in every case, be inflicted by causing to pass through the body of the convict a current of electricity of sufficient intensity to cause death, and the application of such current must be continued until such convict is dead." [FN120] Because the Electrocution Act had not specified the type of current to be applied or in what form, the legislature gave the Medico-Legal Society of New York the responsibility for handling the details of carrying out the new law. [FN121] The Medico-Legal Society was in turn ultimately influenced by the changing focus of the AC-DC controversy.

When by mid-1888 it appeared that the AC proponents were winning the battle of the currents, the DC proponents began emphasizing one distinguishing feature between the systems: AC's greater lethality. [FN122] The accusations of Harold P. Brown, an obscure, self-trained electrician, were particularly significant in making this distinction. [FN123] On June 5, 1888, one day after the Electrocution *574 Act was enacted, Brown contended in a letter to the editor of the New York Evening Post that Westinghouse's high-voltage AC system could be potentially fatal and that the New York Board of Electrical Control should forbid its use. [FN124] In order to substantiate his claims which were attacked by critics, [FN125] Brown asked Edison if he would support a number of electrical experiments on animals so that Brown could gather evidence proving that AC was more dangerous than DC. [FN126] Even though the two had never met, Edison granted Brown's request to use his laboratory and equipment that could not be obtained elsewhere. [FN127] Edison also asked one of his assistants, Arthur E. Kennelly, to help Brown with his experiments. [FN128]

During these experiments in mid-July of 1888, Brown was able to demonstrate that dogs would die instantly with an application of less than 300 volts of AC but tolerate more than 1,000 volts of DC. [FN129] Satisfied that his assertions had support, Brown provided a public demonstration of his results in the lecture hall of Columbia College's School of Mines on July 30, 1888. [FN130] Aided by Dr. Frederick Peterson, [FN131] a member of New York's Medico-Legal Society, Brown demonstrated (with Edison's equipment) the dangers of AC *575 by using a seventy-six pound dog that "withstood" the DC but was then put to death with one application of the AC. [FN132] In response to critics claiming that the dog's resistance had been lowered by DC shocks prior to the fatal application of AC, [FN133] Brown conducted further experiments several days later by fatally electrocuting three different dogs with only AC. [FN134]

By the fall of 1888, the Medico-Legal Society requested that Peterson chair its committee appointed to recommend the details for administering electrocution. [FN135] At this time, Peterson and Brown conducted further experiments with AC on two calves and a horse in response to claims that experiments with smaller animals could not be compared directly with the effect that electricity might have on a human being. [FN136] Members of the Medico-Legal Society, Gerry, and Edison were included among the witnesses. [FN137] As a

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result of the "success" of these experiments, the Medico-Legal Society's committee issued a report recommending the use of AC to be disseminated through a chair; this method, the committee maintained, would ensure death in fifteen to thirty seconds. [FN138] With a unanimous vote, the Medico-Legal Society adopted the committee's *576 recommendation report. [FN139] Following the publicity given the experiments, AC was tied publicly to death. [FN140]

Westinghouse immediately challenged the report, claiming there was no proof that the AC would cause death to a human being. He also claimed that it was known that Brown's experiments were financed by Edison Electric Light Company, a Westinghouse competitor. [FN141] Regardless, during the next year Brown lobbied extensively to have the Electrocution Act carried out, and with Westinghouse equipment, referring to it as the "executioner's current." [FN142]

In March 1889, three months after the Electrocution Act had become effective, state prison officials requested that Brown supply and install the apparatus to be used for electrocution in three state prisons. [FN143] The Edison Company gave Brown considerable assistance, particularly financial, for his efforts and for additional experimentation. [FN144] Eventually, all three prisons relied upon Westinghouse generators. [FN145] Although there are conflicting accounts on who designed the first electric chair, [FN146] it appears that its construction *577 was accomplished by George Fell. [FN147] The next Part of this Article discusses how the Supreme Court decided that electrocution could be used and that William Kemmler would be the first to experience it.

II. THE CREDIBILITY AND CONSEQUENCES OF KEMMLER'S INTERPRETATION OF "CRUEL AND UNUSUAL"

This Part analyzes Kemmler throughout its appellate phases, examining in particular the Supreme Court's failure to decide Kemmler's claim that electrocution was cruel and unusual punishment. The Part then describes the botched Kemmler electrocution, along with the reactions of the public and the press. The Part notes that despite the botch, electrocution rapidly was adopted by other states.

A. Kemmler I: Death by Electrocution

The Electrocution Act was tested when William Kemmler, a twenty-eight year old fruit peddler, [FN148] was convicted on May 10, 1889, of murder in the first degree. [FN149] Kemmler had repeatedly beaten and cut his lover, Matilda Ziegler, [FN150] with a hatchet, axe, and sharp instrument on March 29 [FN151] in a fit of drunken and jealous rage over her relationship with another man. Ziegler died the *578 next day. [FN152] The four-day trial in the Erie County Court of Oyer and Terminer raised little doubt of Kemmler's guilt. He had confessed in jail, and several witnesses stated that he admitted to committing the crime. [FN153] Moreover, the jury rejected Kemmler's principal defense of "mental irresponsibility" that was based on his history of alcoholism. [FN154] On May 14, Kemmler was sentenced to death by electrocution pursuant to the Electrocution Act. [FN155] His execution would be delayed "by one of the most stupendous legal fights ever made." [FN156]

Kemmler I and its appellate phases were influenced significantly by the "battle of the currents." Out of concern that the public might view AC as the more dangerous method, for example, Westinghouse reportedly financed Kemmler's appeal at a cost exceeding \$100,000. [FN157] Westinghouse also retained for Kemmler one of the country's leading lawyers, W. Bourke Cockran. [FN158] It was "generally believed" that Cockran had been instructed "to do everything possible to prevent Kemmler from being the means of proving the truth or falsity of [Harold] Brown's claims." [FN159]

B. Kemmler II: Electrocution and "The Scientific Progress of the Age"

In an October 9, 1889 habeas appeal to the Cayuga County Court, Cockran contended that Kemmler's sentence was invalid because electrocution imposed cruel and unusual punishment in violation of both the Eighth Amendment and the New York Constitution. [FN160] The New York Supreme Court stayed the execution in

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order to appoint a referee to collect testimony and evidence on electrocution's effects for use in evidentiary hearings to be held on the issue. [FN161] It appears that the New York Supreme Court may *579 have been influenced by several key aspects of Kemmler II, a "pioneer case," with "no precedent for guidance or following," and watched with interest from "other states and countries." [FN162]

1. The Evidentiary Hearings

During these evidentiary hearings, testimony was provided by leaders in the field of electricity, including Edison and three future presidents of the American Institute of Electrical Engineers. [FN163] With the exception of one future president, all appeared on behalf of the State. [FN164] Physicians and a group of individuals who had been electrically shocked, accidentally or by lightning, also contributed a large part of the testimony. [FN165] Harold Brown's testimony was particularly critical in the early stages of the hearings. [FN166]

Cockran's primary strategy was to show that electricity was not a painless or certain method of execution. With this end in mind, he first attempted to reveal that Brown's lack of formal education in electrical engineering raised doubts about his qualifications for providing expert advice to the state on electrocution. [FN167] For example, although Brown stated that he was an electrical engineer and had been engaged in the electrical business for thirteen years, he had no special training in electrical matters beyond an ordinary high school education and a preparatory course. [FN168] Further, he admitted that he had no medical knowledge. [FN169] Brown started his practice before any electrical engineering course was taught in college. [FN170] His first job was working with Edison's early inventions. [FN171] Thereafter he worked as an electrical expert at two electric lighting companies. [FN172] At the time of the trial he stated that he was independent of any company and designed electrical equipment for *580 people who required it, [FN173] including New York's Superintendent of State Prisons. [FN174] As Cockran noted, Brown, whose qualifications were self-acquired, never personally saw the application of the electric chair nor observed the conditions under which the current was administered. [FN175]

Cockran attempted to show that proponents of electrocution could not guarantee sufficiently that electricity would not be cruel or unusual or that experiments with animals would produce similar results in human beings. For example, an electrical engineer and expert for Westinghouse testified that he did not think it possible to determine the resistance of a human being with accuracy, [FN176] and that few investigations had been made of the effect that electrical shock had on the human body. [FN177] Another expert, a member of New York's Board of Electrical Control, insisted that it was "utterly impossible" to predict what current would prove lethal in all persons. [FN178] He stated that the dogs who were not killed immediately "appeared to be suffering horrible agony. They gave vent to their agony in howls, piteous wails and cries, and after the current was taken away from them, they fell exhausted at the bottom of the cage." [FN179] This testimony concerning scientific ignorance about any one individual's resistance to electricity was confirmed by other experts. [FN180]

Lastly, Cockran attempted to raise doubts about Edison's testimony that death would be quick and painless and that electrocution would not cause mutilation of the victim's body. [FN181] According to a recent analysis of Edison's testimony by two electrical experts, *581 Cockran's questioning "clearly disclosed the extent of Edison's ignorance of the effects of electrical currents on living organisms." [FN182] Cockran, for example, asked Edison about the mechanical effects which would be produced by the application of a powerful alternating current to human muscles. Edison confessed that he did not know very much "about that part of it." Cockran later asked Edison if he understood anything about anatomy. Edison replied: "No, sir." Cockran continued: "You do not claim to understand anything about the structure of the human body?" Edison answered: "No, sir; only generally." Cockran then asked Edison if he knew whether blood or muscular tissue was the better conductor of electricity. Edison replied that he thought blood was a better conductor, but that he would have to experiment to be absolutely certain. "Do you know anything about the conductivity of the brain?" Cockran continued. Edison responded: "No, sir." [FN183]

In spite of the "confusing and conflicting" testimony that Edison and the other electrical experts and physicians presented, however, it appears that Edison's enormous reputation outweighed Cockran's revelation of his or any

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other expert's ignorance. [FN184] The court in *Kemmler II* found that *Kemmler* did not satisfy the burden of proving that electrocution was cruel and unusual. The constitutionality of the Electrocution Act was presumed. [FN185]

The court emphasized first that the validity of the Act was not to be determined under the Eighth Amendment for two reasons. The Eighth Amendment did not refer to punishments provided in *582 state courts for crimes against the State, but was "addressed solely to the national government," as a constraint on its power. [FN186] The court added, however, that New York State's "fundamental law is so benignant that not even he who cruelly murders can be cruelly punished." [FN187]

Cockran contended that electrocution "may well result in subjecting its unfortunate victim to the most extreme and protracted vigor and subtlety of cruelty and torture." [FN188] Yet the court viewed the Electrocution Act as "a step forward ... based on grounds of mercy and humanity," and consistent "with the scientific progress of the age." [FN189] The court emphasized that electricity would produce "immediate and painless death," thereby preventing the "unsightly and horrifying spectacles which now not infrequently attend executions by hanging." [FN190]

The court further explained that the Electrocution Act had received a considerable amount of planning and attention. The New York Commission was met with "legislative favor and executive approval." [FN191] It was against "all this" that the court was asked to hold the law to be unconstitutional. [FN192]

The court cited other pressures. In this case, the burden was on *Kemmler* to demonstrate that the law at issue was cruel and unusual. Because his burden depended upon "scientific questions" that required the contributions of scientists and other experts in the area, judges could not stand in any better position of judgment than legislators; both were equally ignorant of the subject matter. [FN193] The court acknowledged that the available scientific information *583 was "conflicting," as well as "in great degree speculative and hypothetical." [FN194] As the court explained, electrocution was an untried method of execution, and no previous endeavor had been performed "under the circumstances and conditions, and with the appliances, indicated by scientific knowledge as those most favorable to produce a fatal result." [FN195] Even though the court relied on scientific knowledge for making its decision, it conceded that the information provided was predominantly speculative. [FN196]

2. An Imprecise Definition of "Cruel and Unusual"

An added problem in *Kemmler II* was the lack of a precise definition of "cruel and unusual" punishments. The court noted that although the phrase had a two hundred year history, "[c]ourts have rarely been called upon to construe it," and the court expressed no duty "to attempt any accurate and comprehensive definition." [FN197] The court did state that certain methods of inflicting the death penalty, such as boiling in oil or water, would be considered illegal but that other methods, such as death by hanging or gunshot, would not. [FN198] The court turned in particular to *Wilkerson v. Utah*, [FN199] in which the Supreme Court concluded in dicta that shooting is not a cruel or unusual punishment under the Eighth Amendment. [FN200]

Upon mentioning *Wilkerson*, however, the court began to grope for guidance in attempting to fill the gaps in precedent. First, the court turned to Blackstone who condoned death by hanging, even if the criminal revived and had to be hanged again. [FN201] Then the *584 court questioned whether it had not been "plainly and beyond doubt established that electricity as a death-dealing agent is likely to prove less quick and sure in operation than the rope?" [FN202] Next, the court emphasized the major issue of the case: "What is the duty of courts and judicial officers when called upon to declare, in a case like this, a legislative act void as against the constitution, and by what rule should they be governed?" [FN203]

Upon reviewing prior authority, the court drew three conclusions that represented common views at the time: (1) every legislative act is presumed to be constitutional, and the defendant has the burden of showing it to be unconstitutional; [FN204] (2) in a doubtful case, no act should be annulled by the judiciary since mere conflict of

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interpretation between the legislative and judicial powers is not a sufficient basis for determining that the legislature has erred (the judgment must be beyond a reasonable doubt); [FN205] and (3) a single judge should declare a law to be invalid on constitutional grounds only when "his duty to do so is entirely clear." [FN206]

Applying these standards to *Kemmler II* the court concluded that: (1) *Kemmler* had not overcome the presumption that the Electrocutation Act was constitutional; [FN207] (2) he did not prove beyond a reasonable doubt that the Act should be annulled by the judiciary or that the Act provided a cruel and unusual and thus unconstitutional punishment; [FN208] and (3) he did not show that "a force of electricity sufficient to kill any human subject with celerity and certainty when scientifically applied, cannot be generated." [FN209]

As the court noted, the "utmost that can justly be said in his favor is that there is diversity of opinion on the principal question." [FN210] Yet such diversity was not sufficient to show that the punishment was cruel and unusual. [FN211] Judicial comity and a "decent respect" for *Kemmler I*'s ruling were also major factors influencing *585 the court's decision. [FN212] Similarly, the court left the matter to be decided more definitively by the appellate courts because for it to do more under the tentative circumstances of this case would be "profitless." [FN213]

3. An "All or Nothing" Stance Toward Punishment

Yet another difficulty in *Kemmler II* was the Electrocutation Act's "all or nothing" stance toward punishment. This may have been the single most influential factor in the court's ruling. Section ten of the Electrocutation Act "expressly provided" that "a crime punishable by death must be punished according to its provisions, and not otherwise." [FN214] Thus, section ten made "clear" that "any penal act hereafter passed to apply to those cases [preceding the Electrocutation Act] would necessarily and justly be held void, as ex post facto." [FN215]

As the court in *Kemmler II* noted, then, if the Electrocutation Act were held to be unconstitutional, *Kemmler* and all individuals who had committed capital crimes since the beginning of the year possibly could evade punishment. [FN216] In this sense, the court had no choice but to follow the Act; the alternative would have been unacceptable.

C. *Kemmler III*: Upholding Electrocutation As "Instantaneous, and Therefore Painless, Death"

Kemmler appealed to the Supreme Court of New York, which consisted of a panel of three judges. [FN217] The court in *Kemmler III* noted the "[v]ery voluminous evidence" accumulated by both sides concerning the constitutionality of the Electrocutation Act. [FN218] The court focused in particular, however, on the history and purpose of the Eighth Amendment. [FN219]

*586 The court first noted that no provision of the English Bill of Rights was to serve as a restriction upon the power of the legislative branch of the government of England. [FN220] Yet, there was a contrary expectation in New York at the time of this case. [FN221] As the court explained, if the State's provision against cruel and unusual punishment was to have any practical effect, it "must have been intended as a restriction upon the legislative authority." [FN222] Consequently, "if occasion should arise it would be the duty of the courts to enforce it." [FN223] The court's analysis therefore differed considerably from that of the court in *Kemmler II* on this issue. *Kemmler III* concluded that the courts had an obligation to enforce the State's cruel and unusual punishment provision even if it restricted legislative authority.

Kemmler III was consistent with *Kemmler II*, however, in its determination that although it was "common knowledge" that certain punishments, such as disembowelling, were cruel and unusual, electrocution was different. [FN224] The court "conceded" that electrocution was "unusual," but stated that "no common knowledge or consent that it is cruel" existed. [FN225] The more common belief was that electrocution, "under favorable circumstances, is instantaneous and without pain." [FN226] Therefore, it was a "question of fact whether an electric current, of sufficient intensity, and skillfully applied, will produce death without unnecessary

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suffering." [FN227]

Whether the court or the legislature was to determine this question of fact, however, was an issue of first impression. [FN228] Consistent with *Kemmler II*, *Kemmler III* shied from employing judicial review, contending that the court was not competent to determine whether the legislature was "ignorant of the character and effect of the penalty prescribed." [FN229] As the court in *Kemmler III* emphasized, "nothing" in the Constitution or "in the nature of things" *587 suggested that the court's judgment was superior to the legislature's in determining "a mere question of fact involved in legislation." [FN230]

In support of this proposition, the court in *Kemmler III* referred to precedent, stating that the court must assume that the legislature had sufficient facts before it to make a sound decision. [FN231] In this sense, the question "is not one of fact, but of law, to be determined by the record." [FN232] The court emphasized that *Kemmler* had not demonstrated beyond a reasonable doubt that the Electrocution Act was cruel and unusual. [FN233] Indeed, the court concluded that electrical science of the day could generate "a current of electricity of such known and sufficient force as certainly to produce instantaneous, and therefore painless, death." [FN234]

Similar to *Kemmler II*, however, in *Kemmler III* the court recognized the limitations of scientific knowledge. [FN235] For example, there was no knowledge about the nature of electricity or how it produced death. Electrical experiments had been conducted only on "the lower animals." [FN236] Case studies of accidentally electrocuted persons provided limited information: "the contact is imperfect, the resistance unregulated, and the force of the current accidentally deflected through the body of the subject, only a fraction of that being transmitted through the wires." [FN237] The court noted that in some of these cases, the victim did not die; in others, the death was "accompanied with burnings and contortions." [FN238]

The court emphasized, however, that the failed electrocutions were attributed to imperfect methods of applying the electricity. [FN239] Instead, "instant death" would result "under chosen conditions of contact and resistance." [FN240] Based upon this rationale, *Kemmler III* *588 affirmed *Kemmler II*'s order dismissing the writ of habeas corpus. [FN241]

D. *Kemmler IV*: "The Possible Risk of Torture and Unnecessary Pain"

On March 21, 1890, *Kemmler* again appealed to the New York Court of Appeals. [FN242] The court in *Kemmler IV* essentially affirmed the conclusions and rationales of the prior courts' holdings. [FN243]

The court explained that any method of inflicting the death penalty "must necessarily be accompanied with ... some degree of cruelty." [FN244] Moreover, the Electrocution Act did not allow for any additional type of punishment. [FN245] The court concluded that the *589 Act could be "assailed in no other way than by attempting to show that the new mode of carrying out a death sentence subjects the person convicted to the possible risk of torture and unnecessary pain." [FN246] The court contended, though, that this rationale could be applied to any experimental method of execution and, when followed to "its logical results, would prohibit the enforcement of the death penalty at all." [FN247]

Like prior courts, the appellate court in *Kemmler IV* briefly reviewed the history of the cruel and unusual punishments provision, although it never attempted to define the terms. [FN248] The court also noted, like the lower courts, the "care and caution and unusual deliberation" that the legislature followed to change the method of exercising the death sentence. [FN249] For this reason, the court commented that [i]t would be a strange result, indeed, if it could now be held that its efforts to devise a more humane method of carrying out the sentence of death in capital cases have culminated in the enactment of a law in conflict with the provisions of the [state] constitution prohibiting cruel and unusual punishments. [FN250]

Kemmler IV concluded that the testimony provided earlier by the referee contained a "valuable collection of facts and opinions touching the use of electricity as a means of producing death ..., but nothing more." [FN251]

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Instead, the court agreed with the lower courts that the evidence eliminated "every reasonable doubt" that the use of electricity "under such conditions and in the manner contemplated by the statute, must result in instantaneous, and consequently in painless, death." [FN252]

***590 E. Kemmler: "Punishments Are Cruel When They Involve Torture or a Lingering Death"**

After exhausting all avenues of appeal at the state level, Kemmler petitioned the United States Supreme Court, which heard his case on May 20, 1890. [FN253] Kemmler argued primarily that his execution would violate both the Privileges and Immunities and Due Process Clauses of the Fourteenth Amendment by depriving him of life without due process of law. [FN254] The Supreme Court unanimously denied Kemmler's appeal, [FN255] but offered the first thorough analysis of the pertinent constitutional provisions based upon a Fourteenth Amendment theory of constitutional law. [FN256]

First, the Court noted the nearly identical wording of the Eighth Amendment and the New York state constitution, but this time in the context of interpreting the Fourteenth Amendment. [FN257] Then, in a conclusion that later would be overruled, [FN258] the Court held, as had the state courts below, that the Eighth Amendment did not apply to the states. [FN259]

The Court discussed the meaning of "cruel and unusual" by referring to the Court's earlier attempt toward a definition in *Wilkerson v. Utah*. [FN260] In *Wilkerson*, the Court had deferred to Blackstone: " '[I]t is safe to affirm that punishments of torture, such as those mentioned by [Blackstone], and all others in the same line of unnecessary cruelty, are forbidden by [the Eighth Amendment] to the Constitution.' " [FN261] Embellishing this definition in *Kemmler*, the ***591** Supreme Court proposed a standard of cruelty that would be cited continuously over the course of the next century: [FN262] Punishments are cruel when they involve torture or a lingering death; but the punishment of death is not cruel, within the meaning of that word as used in the Constitution. It implies there is something inhuman and barbarous, something more than the mere extinguishment of life. [FN263]

In light of this standard, the Court held that the decisions of the state courts affirming the validity of the Electrocution Act were not open to the Court's reexamination. [FN264] The lower courts had held that electrocution was not cruel based upon the evidence brought before them, and the legislature had the responsibility for determining how a death sentence should be executed. [FN265] Nor was the state court decision prohibitive of "any title, right, privilege, or immunity" claimed by Kemmler under the United States Constitution. [FN266] The Court emphasized that the Fourteenth Amendment did not change the relationship between the federal and state governments, nor the relationship between both types of government and the people. [FN267] Moreover, the Amendment "was not designed to interfere with the power of the State to protect the lives, liberties and property of its citizens, and to promote their health, peace, morals, education and good order." [FN268]

For these reasons, the Court held that the Electrocution Act was a legitimate use of the legislative power of the State. [FN269] Furthermore, the state courts had held that the legislature would not inflict a cruel and unusual punishment. [FN270] The Court concluded that the State had not abridged Kemmler's privileges or immunities or denied him due process of law under the Fourteenth Amendment. [FN271] Today, Kemmler generally represents the proposition that ***592** a punishment may be constitutional even if it is unusual, so long as it has a humanitarian purpose and effect. [FN272]

F. The Content and Rationale of Kemmler

The Kemmler appeals were based in part on particular uncertainties and pressures resulting from the passage of the Electrocution Act. The way each court approached these pressures, and relied on a prior court's decision regarding them, considerably influenced the Supreme Court's final decision. The courts' rationales for their conclusions are outlined in the following sections.

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1. The Electrocution Act Was Created to Ensure a More Humane Method of Punishment

The main purpose of the Electrocution Act was to provide a more humane method of applying the death penalty. [FN273] The court in *Kemmler IV* reasoned that the method of electrocution was humane because the legislature intended it to be so. The court emphasized that "[i]t would be a strange result" if the legislature's efforts conflicted with the state constitution's provisions prohibiting cruel and unusual punishment. [FN274]

Based on this reasoning, *Kemmler IV* concluded that whether electrocution was a more humane method of execution was a question left solely for the legislature, whose decision the court would follow. [FN275] Further, the court found little in the testimony taken by the referee to support *Kemmler's* contention that electrocution was cruel. [FN276] This conclusion fueled the court's assertion that electrocution, when appropriately applied, "must result in instantaneous, and consequently in painless, death." [FN277]

2. The Electrocution Act Met Legislative Approval

Kemmler II summarizes the stance on this issue taken by the other courts. Judges were in no better position than the legislature *593 to come to a decision about the evidence on electrocution, for both equally lacked knowledge of the subject matter. [FN278]

3. Scientific Knowledge of Electrocution Appeared Both Certain and Speculative

The court in *Kemmler II* assessed substantial evidence on the effects of electrocution [FN279] on which the later courts relied. Given modern standards for examining scientific research, however, no definitive evidence proved that these methods, which were tested on animals, would be truly painless when applied to human beings. Furthermore, both Edison [FN280] and Brown [FN281] lacked knowledge of the effects of electricity on humans and the electrocution process.

It becomes clear throughout the *Kemmler* appeals, however, that the courts relied heavily on the conclusions of the New York state legislature in determining that the application of electrocution was more humane than prior punishments. Although the courts acknowledged the uncertainty of scientific information, both *Kemmler II* and *Kemmler III*, for example, stated that electrocution would result in an instantaneous and painless death, [FN282] thereby avoiding the horrors of hanging. [FN283] As Part III of this Article shows, such conclusions have had an overwhelming effect on courts' assessments of the effects of electrocution. Further, these later cases relying on *Kemmler* fail to recognize that the New York state legislature may have been influenced more by political and financial factors than humanitarian concerns.

4. Political and Financial Forces Outweighed Humanitarian Concerns

The historical background of the anti-capital punishment movement and the resistance to it suggest that the New York state legislature was seeking a humanitarian method of execution. [FN284] It appears, *594 however, that the New York Commission was drawn to the use of electrocution as a result of a marketing competition between Westinghouse and Edison in which Edison claimed that his rival's alternating current was so dangerous it could kill people. [FN285] Edison's testimony concerning the greater humanitarian purpose of electrocution in the *Kemmler II* evidentiary hearings in turn had a substantial effect on the courts' acceptance of the validity of electrocution in *Kemmler*. [FN286] Yet some commentators have suggested that money, not humanity, was Edison's motivating concern. A key factor in overwhelming opposition to electrocution was the authority of [Edison's] confident claim that death would be instantaneous. This was combined with a shameful "dirty tricks" campaign, in which Westinghouse's alternating current, then competing with the direct current preferred by Edison, was to be denigrated. [FN287]

Whether or to what degree Edison was solely financially influenced may never be known. Regardless, the extent of his persuasion is demonstrated in the modern day use of the chair.

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5. The Electrocution Act Had No Alternative Punishment

The court in *Kemmler II* noted that under section ten of the Electrocution Act, *Kemmler* and possibly all individuals who had been convicted of capital crimes since the beginning of the year could "go unpunished" if the Electrocution Act were held to be unconstitutional. [FN288] Any penal act enacted to apply to their cases could be held void as *ex post facto*. [FN289]

This circumstance necessarily put a considerably greater burden on *Kemmler* to prove that electrocution was cruel. It appeared that he had no alternative punishment as a basis for contending that he was indeed being punished, albeit less cruelly. *Kemmler* was forced to argue that electrocution was so cruel that it justified no punishment *595 whatsoever. [FN290] In turn, the *Kemmler* courts apparently had no choice but to prefer a punishment of unknown and untested cruelty, which the legislature endorsed, over no punishment at all. [FN291] To have done otherwise would have appeared irrational. [FN292]

A collateral issue concerns whether or not a court would have actually followed a "no punishment" stance for *Kemmler* if electrocution had actually been determined unconstitutional. For example, it appears more likely that a court would have followed the attorney general's stance. The attorney general contended that the amendments proposed by an Act later deemed unconstitutional are void and unable to change the law as it existed prior to the Act. Thus, the finding that an execution method is unconstitutional would not repeal any part of the original statute allowing the imposition of the death penalty. [FN293] Therefore, it seems as though the *596 *Kemmler* courts may have been influenced by a constraint that, for all intents and purposes, never would have been realized. It can be considered whether their stance was an instrumental facade in an effort to lock in electrocution and, incidentally, the ongoing enforcement of the death penalty.

6. The Courts Had No Precedent or Guidance

Kemmler was a fact-based opinion involving specific pressures and uncertainties of the time and, as such, does not deserve the strong precedential effect it has subsequently acquired. Apart from *Blackstone* [FN294] and *Wilkerson v. Utah*, [FN295] the Court had limited precedent for its decisionmaking. Furthermore, electrocution had never before been tried on a human being. These circumstances appeared to have influenced the courts' analyses and their recommendation of an unknown punishment.

7. The Courts Had No Clear Standard for "Cruel and Unusual"

In dicta, the Supreme Court in *Kemmler* presented an "historical" interpretation of the Cruel and Unusual Punishments Clause which suggested that the standard for determining the constitutionality of an execution method should depend on the contemporary norms at the time the Bill of Rights was adopted. [FN296] [A]s long as the Court took for granted that the clause extended only to punishments that the Framers thought cruel in 1789, there was little need to invoke it; for there was little danger that an American legislature would authorize the rack, the wheel, or drawing and quartering as criminal punishments. [FN297]

As the next Part of this Article discusses, however, with time the Court has discarded such an interpretation, thereby upholding *597 prohibitions under the Clause that include far more than those penalties considered cruel in 1789. [FN298]

Unfortunately, the lower courts in *Kemmler* also never offered a clear, workable definition of "cruel and unusual." The Supreme Court's standard that "[p]unishments are cruel when they involve torture or a lingering death ... something more than the mere extinguishment of life," [FN299] appears not to have prompted an analysis more sophisticated than a comparison of electrocution with past punishments. Rather, each court relied on a standard requiring *Kemmler* to "prove beyond a reasonable doubt" that the Act should be annulled by the judiciary or that the Act provided a cruel and unusual and thus unconstitutional punishment. [FN300] Although the "proof beyond a reasonable doubt" standard may have been acceptable at the time *Kemmler* was decided,

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[FN301] it is unlikely that such a high burden of proof would be required today. [FN302] Moreover, no court has ever cited *Kemmler* in support of using the "beyond a reasonable doubt standard" in the context in which *Kemmler* applied it.

8. The Validity of the Electrocution Act Was Determined Only Under the New York State Constitution

Kemmler held that the Eighth Amendment's provision against cruel and unusual punishment was not applicable because the Amendment made no reference to punishments provided in state *598 courts for crimes against the State. [FN303] This holding was overruled decades later in *Robinson v. California*, [FN304] which incorporated the Eighth Amendment into the Due Process Clause of the Fourteenth Amendment. [FN305] Prior to such incorporation, *Kemmler* was only one of nine cases that discussed Eighth Amendment claims during the Court's first 175 years. [FN306] Because *Kemmler* was not decided under the Eighth Amendment, *Kemmler's* claims did not receive the type of scrutiny they might have otherwise.

G. *Kemmler's* Aftermath: An "Awful Botch" [FN307]

After sentencing, *Kemmler* was held in solitary confinement at the Auburn State Prison. [FN308] As the date for his electrocution approached, "a more abject, crushed, terrorized man ha[d] never been seen among all the criminals who have met death by the law." [FN309] In the meantime, the upcoming execution spurred other events. Newspapers and articles criticized the proposed "experiment with death by electricity," prompting a resolution for the repeal of the Electrocution Act that later was rejected. [FN310] Westinghouse *599 sought an action to restrain the State from using its dynamos for the purposes of execution, claiming that Brown "illegally and fraudulently obtained possession of them by collusion with [Westinghouse] customers having a lease." [FN311] Proponents of AC were already attempting to avoid challenges by those witnessing the electrocution. [FN312]

On August 6, 1890, at 6:38 a.m., *Kemmler*, "pale" but composed, was taken to the chamber to be executed. [FN313] The execution procedure was comparable to that used today. [FN314] Officials strapped him to a wooden chair and applied electrodes to his head (his hair was closely clipped) and lower back. [FN315] It is unclear whether they affixed a mask to his face. [FN316] Of the twenty-five official witnesses present in the room, fourteen were physicians. [FN317] The two physicians in charge of the execution were Dr. E.C. Spitzka, a neurologist, and *600 Dr. Carlos F. MacDonald, chairman of the New York State Lunacy Commission. [FN318]

The execution, however, resulted in a mishap. After the current had been released for seventeen seconds and the attending physician pronounced *Kemmler* dead, *Kemmler's* body twitched a half minute later. [FN319] Officials believed that *Kemmler* was still alive, but had to wait several minutes until the current could be reapplied. [FN320] This second contact lasted for seventy seconds, [FN321] during which *Kemmler's* hair and flesh began to burn. [FN322]

The three doctors who conducted the autopsy about three hours after the execution concluded that *Kemmler* became "instantly unconscious" by the first jolt and remained so during the entire procedure, confirming that his death was "painless." [FN323] There was, *601 however, "[e]xtensive charring" of *Kemmler's* body at the points where the electrodes attached. [FN324] Moreover, one doctor described as "awful" the four-and-one-half minute interim between the first and the last application of current. [FN325] "I want never again to witness anything like that. You may kill a man--but kill him." [FN326]

1. Reasons for the Botch

A number of electricians explained that the execution was botched because the machinery was grossly defective; it failed to provide sufficient power, a steady current, or proper contact with *Kemmler's* body. [FN327] Southwick, who expressed the minority view that *Kemmler's* execution was the "grandest success of the age," [FN328] conceded there were problems. [FN329] The current should have been maintained for a longer time.

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[FN330] Moreover, he thought that Kemmler's body "offered much more than ordinary resistance to the current of electricity." [FN331]

Edison stated that the problems with Kemmler's execution could be attributed to the doctors involved. [FN332] He noted that they inappropriately attempted to apply the electricity to the base of Kemmler's skull, his nerve center, because bone is one of the worst conductors. [FN333] He recommended the use of liquid electrodes that relied *602 on hand-to-hand contact, so that the path of the current would cross the chest. [FN334] Indeed, there was evidence that Kemmler's flesh burned around the electrodes because the wet sponges that were used to increase electrical conductivity did not fill the cups and thus should have been larger. [FN335]

There also appeared to be mechanical difficulties. Charles R. Barnes, an electrician for the city who had operated the dynamo, claimed that it nearly broke down at the "critical moment" because the generator's belts, which were too new to wear properly, almost flew off before the signal came to shut down. [FN336] Dr. Spitzka also blamed the equipment. [FN337]

Whether the execution was botched purposefully in order to deter the further use of AC also was considered. Some evidence indicated that the equipment could have been far superior than it was. [FN338] Spitzka acknowledged this possibility: Yes, there might have been corrupt reasons for this. The interests of the company who manufacture the dynamos [which are based upon a Westinghouse pattern] would certainly be advanced by the defects in the machinery.... Their ends would be served quite ... efficiently if this execution was a botch, as it largely was, and would consequently meet with public disapproval and condemnation, such as would demand repeal of the law. [FN339]

There appears, however, to be no explanation for the abandonment of any further investigation of this suggestion.

*603 2. Reactions to the Botch

New York's use of electrocution attracted much national and international attention. [FN340] Yet, Kemmler's execution--his movements, the delay between applications of the currents, and the extent of burning--elicited mixed reactions in numerous articles in newspapers, magazines, and medical and legal journals. [FN341] Although a law prohibited the press from publishing detailed accounts of the execution, the press ignored the proscription. [FN342] According to the New York World, Kemmler was "slowly roasted to death" [FN343] whereas the Washington Post wrote that Kemmler had been "burned and shocked [until his] life was extinct." [FN344] The New York Herald stated that the execution was "death by torture," [FN345] and the New York Times depicted the process as "a disgrace to civilization." [FN346] Taking accounts from papers in the East and West, the Utica Saturday Globe reported that popular opinion considered electrocution to be "[f]ar worse than hanging." [FN347]

This opposition was also voiced by those more directly involved in the execution. According to Dr. Shrady, one of the doctors who witnessed the electrocution and performed the autopsy, the new system of electrocution was not a more civilized method of death compared, for example, to either the guillotine or the gallows. [FN348] Dr. Spitzka also witnessed the execution and insisted that "[t]he death chair will yet be the pulpit from which the doctrine of the abolition of capital punishment will be preached." [FN349] Westinghouse *604 insisted that "[t]hey could have done better with an axe," [FN350] whereas the Westinghouse Company's attorney stated that too many uncertainties were involved in the process, [FN351] that a hangman was more reliable. [FN352] Commentary in the Harvard Law Review contended that the New York court's holding in Kemmler that execution by electricity was not violative of the State's constitution could be overruled with evidence from subsequent experimentation. [FN353] The press ultimately was joined by both supporters and critics of capital punishment in calling for a repeal of the Electrocution Act. [FN354]

Those who thought that the execution was a success favorably compared electrocution, which had not yet been proven to be cruel, to the "barbarism of hanging." [FN355] Scientists attending a session of the American Society

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of Microscopists a month later claimed that an analysis of Kemmler's blood indicated that his death was "immediate and painless." [FN356] Edison expressed doubt that Kemmler had received the full charge for the time stated and predicted that the next criminal's death would be instant. [FN357] Warden Charles F. Durston of Auburn prison, Doctor Fell, and another physician claimed that the execution was "satisfactory." [FN358] Southwick, it appears, was the most enthusiastic. [FN359]

Despite the overwhelming opposition to Kemmler's execution, electrocutions resumed. In response to this opposition, however, prison authorities excluded representatives of the press. [FN360] Four *605 men were executed at Sing Sing state prison in New York on July 7, 1891 and another later that year. [FN361] Because the press was not present, details about the executions are not known, although autopsy reports on the bodies indicate that they were considerably less marked than Kemmler's. [FN362]

The press' continued criticism and suspicion over their exclusion from these six executions resulted in their invitation to witness the seventh electrocution, that of Charles E. MacElvaine, on February 8, 1892. [FN363] For a variety of reasons, prison officials decided to apply Edison's recommended liquid electrocution method, perhaps as a way of gaining press favor by using Edison's prestige. [FN364] Edison also had indicated that his method would prevent the facial burning and discoloration created by electrodes in earlier executions. [FN365] Regardless, officials also attached to MacElvaine the typical head and calf electrodes in case Edison's system failed. [FN366]

The system did fail. MacElvaine, who was seated in an Edison chair with each hand strapped in a bucket of salt water, appeared unconscious but still alive after the first charge of 1,600 volts was applied to his hand electrodes for fifty seconds. [FN367] When physicians started to examine his body, he wheezed, coughed, and gasped, requiring the immediate application of a second charge through the back-up head-calf electrode system. [FN368] Death was certain after the second charge. [FN369]

Contrary to Edison's expectations, hand-to-hand resistance, which he had expected to be lower, was twice as high as head-to-calf. [FN370] Yet even though there was a consensus that Edison's method failed and it was never used again, criticism of Edison was *606 "polite." [FN371] The execution hindered Edison's future participation in electrocution technology, but left his immense status intact. [FN372]

Electrocution also became a popular means of capital punishment in other states, beginning with Ohio in 1896, Massachusetts in 1898, New Jersey in 1907, Virginia in 1908, North Carolina in 1909, and Kentucky in 1910. [FN373] By 1910, a physician and expert on the brain had concluded that electrocution was "the most humane, decent and scientific method of inflicting the death penalty ever devised because of its efficiency, quickness and painlessness." [FN374] This conclusion was reached despite the Kemmler mishap and other grotesque electrocution botches occurring soon thereafter. [FN375] *607 States' adoption of electrocution continued throughout the century. By 1971, twenty-three states had authorized its use. [FN376]

III. THE SUPREME COURT'S EVOLVING EXECUTION JURISPRUDENCE

Following Kemmler's execution, a series of state courts summarily rejected challenges to the use of electrocution as an execution method by citing Kemmler. [FN377] In 1915, the Supreme Court again rejected a challenge to electrocution in *Malloy v. South Carolina*, [FN378] also in reliance on Kemmler. [FN379] The Court held that South Carolina's implementation of death through electrocution rather than hanging, the State's prior execution method, did not increase the punishment for murder but only changed its mode. [FN380] Such change was not unconstitutional under the ex post facto provision. [FN381]

A. Louisiana ex rel. Francis v. Resweber

Considerably more influential in the Court's execution jurisprudence, however, was *Louisiana ex rel. Francis v. Resweber*, [FN382] which was decided thirty-two years after *Malloy*. Willie Francis, a sixteen-year-old black,

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was convicted by an all-white jury of murdering Andrew Thomas, a popular white druggist, in St. Martinville, *608 Louisiana. [FN383] Francis was sentenced to be electrocuted under a death warrant specifying the administration of an electric current of "sufficient intensity to cause death, and the application and continuance of such current" until Francis was dead. [FN384]

1. "Accidents Happen for Which No Man Is to Blame"

Unlike most states at that time, Louisiana did not execute prisoners in the state penitentiary. [FN385] Instead, the State delivered a portable, hardwood electric chair to the town where the crime had been committed. [FN386] On May 3, 1946, the execution date, officials strapped Francis into the portable chair and placed a wetted hood (to enhance electrical conductivity) over his eyes. [FN387] Francis' execution, however, failed. As the Court in Francis [FN388] explained, "[t]he executioner threw the switch but, presumably because of some mechanical difficulty, death did not result." [FN389]

Francis physically reacted to an unspecified amount of current. According to one eyewitness account, "Willie Francis' lips puffed out and he groaned and jumped so that the chair came off the floor. Apparently the switch was turned on twice and then the condemned man yelled: 'Take it [the hood] off. Let me breath [sic].'" [FN390] Immediately thereafter, Francis' hood was removed and he was unstrapped. As in Kemmler's case, it appears that insufficient *609 current was applied. [FN391] Although the Governor granted Francis a reprieve from a second immediate attempt, a new death warrant was issued. [FN392]

Francis' execution was stayed and a writ of certiorari granted for his claim that a second attempt at electrocution would be cruel and unusual punishment under the Eighth Amendment and a violation of his due process rights. [FN393] Thus, contrary to Kemmler, the issue in Francis was not whether electrocution was unconstitutional per se, [FN394] but whether the State of Louisiana constitutionally could execute Francis after the electric chair had malfunctioned accidentally during the first attempt. [FN395]

The Supreme Court denied relief, concluding that a second execution would not be unconstitutional. [FN396] Although the Court did not overrule Kemmler by holding that the Eighth Amendment applied to the states, eight members of the Court seemed to assume its applicability. [FN397] In examining the circumstances of Francis "under the assumption, but without so deciding," that the Eighth Amendment applied, [FN398] a plurality of four Justices interpreted the Cruel and Unusual Punishments Clause to prohibit only the "infliction *610 of unnecessary pain," [FN399] not the suffering created in an "unforeseeable accident." [FN400] The Justices thus assumed, based on the evidence before them, that state officials "carried out their duties ... in a careful and humane manner." [FN401] They concluded that "accidents happen for which no man is to blame." [FN402]

Using this accident analogy, the Court equated Francis' suffering from this "accident" to the "identical amount of pain and anguish" he would have suffered in any other accident, such as a fire in the cell block. [FN403] No cruelty was involved because there was no "purpose to inflict unnecessary pain nor [was] any unnecessary pain involved in the proposed execution." [FN404]

2. The Executioner's Lack of Intent "Cannot Lessen the Torture"

The four dissenting Justices recommended issuing a stay of execution and remanding the case to determine the nature of the punishment already inflicted on Francis and the punishment which could be inflicted. [FN405] The dissent emphasized, however, that the "all-important consideration is that the execution shall be so instantaneous and substantially painless that the punishment shall be reduced, as nearly as possible, to no more than that of death itself." [FN406] In determining whether the procedure is unconstitutional, then, "instantaneous death" must be measured against the administration of "death by installments," which is caused when electric shocks are applied after one or more intervening periods to a victim who is conscious. [FN407]

The dissent particularly questioned the plurality's requirement of intentionality on the part of the state officials.

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[FN408] Emphasizing *611 instead the State's statutory duty to ensure a proper execution with a continuous current, [FN409] the dissent argued that [t]he procedure in this case contrasts with common knowledge of precautions generally taken elsewhere to insure against failure of electrocutions. The high standard of care generally taken evidences the significance properly attached to the unconditional requirement of a single continued application of the current until death results. Neither the Legislature nor the Supreme Court of Louisiana has expressed approval of electrocution other than by one continuous application of a lethal current. [FN410]

Indeed, court affidavits later indicated that Francis' execution was devoid of precautions, although this evidence was never admitted to the Court. [FN411] For example, the two men responsible for setting up the portable electric chair encountered a number of problems with the wiring and the electrical generator. [FN412] Moreover, both were drinking at the time. [FN413] Although the death warrant stipulated that the current had to be applied continuously, one witness testified that Francis received more than one shock of electricity. [FN414]

As one commentator has noted, the plurality's assertion that "[l]aws cannot prevent accidents" [FN415] evaded the issue of the State's responsibility to administer executions properly. [FN416] The State is constitutionally required to perform executions that are not cruel and unusual. No such standard is applied to prevent accidents. [FN417]

Another concern, however, was the plurality's requirement that there be a "purpose to inflict unnecessary pain" in order to show that the method was unconstitutional. [FN418] In light of the plurality's *612 depiction of Francis' experience as an "accident," such intention was never shown. [FN419] The dissent emphasized, however, what appeared to it to be obvious: the executioner's lack of intent "cannot lessen the torture or excuse the result." [FN420]

More compelling, however, was the dissent's claim that intentionality could be shown with additional attempts, [FN421] thereby provoking an as yet unanswered question. What number of "deliberate and intentional" attempts at electrocution were required to create an unconstitutionally cruel punishment? [FN422] Justice Frankfurter explained that his deciding fifth vote did "not mean that a hypothetical situation, which assumes a series of abortive attempts at electrocution ... would not raise different questions." [FN423] Indeed, as some commentators suggest, this hypothetical now exists and the questions are before us. [FN424]

The Francis case initially generated considerable commentary. [FN425] Of particular significance here is that both the plurality and the dissent relied on Kemmler's "torture or lingering death" standard for cruelty. [FN426] Yet the Court did not review evidence of any potential pain that an individual may suffer during electrocution. [FN427] Even the dissent appeared to assume that, properly applied, electrocution would be painless and instantaneous. [FN428]

*613 B. The Eighth Amendment's "Evolving Standards of Decency"

Fifteen years after Francis, the Court held in *Robinson v. California* [FN429] that the Eighth Amendment did apply to the states through the Due Process Clause of the Fourteenth Amendment. [FN430] Subsequently, in *Furman v. Georgia*, [FN431] Justice Douglas relied on both Francis and Robinson to conclude that the Eighth Amendment's applicability to the states through the Fourteenth Amendment was "now settled." [FN432]

Both before and after Francis, the Court's Eighth Amendment doctrine emphasized an evolving standard of cruel and unusual punishment. [FN433] Under this doctrine, the prohibition on cruel and unusual punishment "is not fastened to the obsolete, but may acquire meaning as public opinion becomes enlightened by a humane justice." [FN434] This evolution occurs because "[t]ime works changes, [and] brings into existence new conditions and purposes. Therefore, a principle to be vital must be capable of wider application than the mischief which gave it birth." [FN435] For these reasons, the Court has viewed the Eighth Amendment "in a flexible and dynamic manner," [FN436] recognizing that the Cruel and Unusual Punishments Clause "draw[s] its meaning from the evolving standards of decency that mark the progress of a maturing society." [FN437] "While the State

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has the power to punish, the [Clause] stands to *614 assure that this power be exercised within the limits of civilized standards.' " [FN438]

Thus, current claims of cruel and unusual punishment must be assessed "in the light of contemporary human knowledge," [FN439] based upon "nothing less than the dignity of man." [FN440] The State must not inflict on the prisoner more than the "necessary suffering inherent in any method employed to extinguish life humanely. There is no purpose to inflict unnecessary pain ... in the proposed execution." [FN441]

Regardless of this jurisprudence, the Court has remained closed to considering the constitutionality either of electrocution or of other execution methods. This situation exists despite evidence that such methods may be unconstitutionally cruel. In *Glass v. Louisiana*, [FN442] for example, the Court denied certiorari in a case in which a prisoner challenged his death sentence by electrocution as cruel and unusual. [FN443] In a lengthy dissent from the denial, Justice Brennan, joined by Justice Marshall, denounced both the law and the method of electrocution. [FN444]

First, the dissent depicted *Kemmler* as "antiquated authority" given the Eighth Amendment's applicability to the states. [FN445] Next, it suggested three criteria that courts should use in determining the constitutionality of a particular method of execution based on post-*Kemmler* Eighth Amendment jurisprudence: [FN446] (1) "unnecessary pain," [FN447] (2) "physical violence," which creates an affront to the "dignity of man," [FN448] and (3) " 'mutilation.' " [FN449] The dissent argued that "[i]f a method of execution does not satisfy these criteria-- *615 if it causes 'torture or a lingering death' in a significant number of cases--then unnecessary cruelty inheres in that method of execution and the method violates the Cruel and Unusual Punishments Clause." [FN450]

The dissent emphasized that because the lower courts have rejected so definitively any constitutional challenge to electrocution, the evidence on the effects of electrocution has "not been tested through the adversarial truthfinding process." [FN451] In addition, information on the procedural aspects of electrocution, how electrocution actually was carried out, was largely unknown because executions were conducted in private with few witnesses. [FN452] This circumstance was even more disturbing in light of the extensive empirical evidence and eyewitness testimony suggesting that electrocution violates each of the three criteria mentioned for evaluating the constitutionality of a method of punishment. [FN453] Moreover, even if electrocution did not result in such pain and indignities, "the apparent century-long pattern of 'abortive attempts' and lingering deaths suggests that this method of execution carries an unconstitutionally high risk of causing such atrocities." [FN454]

*616 C. *Kemmler*'s Precedential Force

Even though *Kemmler* is consistent with current Eighth Amendment jurisprudence, [FN455] the Court has made its interpretation of cruel and unusual more progressive. [FN456] Yet, as the dissent in *Glass* indicated, state and federal courts repeatedly cite *Kemmler* as dispositive with respect to any further factual or legal inquiry regarding the constitutionality of electrocution. [FN457]

An overview of the mechanics of precedent is beyond the scope of this Article. [FN458] However, an analysis of all 226 cases that have cited *Kemmler* from the time the case was decided to the present firmly supports the depiction by the dissent in *Glass* of *Kemmler*'s precedential force. This analysis also demonstrates that courts have relied on *Kemmler* for far more than simply constitutional support for the use of electrocution. [FN459]

*617 1. Courts' Use of *Kemmler* to Support All Methods of Execution

Courts have relied on *Kemmler* in their discussions of each of the five different methods of execution currently used in the United States: shooting, hanging, electrocution, lethal gas, and lethal injection. Forty-four of these cases cited *Kemmler* in their discussion of the constitutionality of electrocution. [FN460] In turn, most of *618 these cases cited *Kemmler* to counter the petitioner's contention that death by electrocution is cruel and unusual. [FN461]

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Of the seven cases that cited Kemmler in their discussion of the constitutionality of lethal gas, four state court cases used the reference to support their conclusion that lethal gas was constitutional. [FN462] Two state court cases cited Kemmler in their analyses of the constitutionality of lethal injection, [FN463] and one of shooting. [FN464] Three state courts justified hanging, [FN465] although one state court case cited Kemmler in dicta in its conclusion that hanging was unconstitutional *619 because the evidence showed it produced a lingering death. [FN466]

Whether Kemmler is valid precedent for those cases that rely on it to support a particular execution method other than electrocution is questionable. Kemmler never addressed the use of lethal gas, which seems not to have existed in 1890, or lethal injection, which the New York Commission rejected in favor of electrocution. [FN467] *Wilkerson v. Utah*, [FN468] which Kemmler cites, [FN469] provides more direct support (albeit in dicta) for the constitutionality of shooting, another method the New York Commission bypassed in 1888. Most questionable are those state courts that use Kemmler as constitutional support for hanging, the method the New York legislature sought to displace.

On the other hand, one could argue that Kemmler's "torture" or "lingering death" cruelty standard, and not the history behind it, could be used to measure the cruelty of other execution techniques by analogy. Although the New York Commission had rejected *620 other methods of execution in lieu of electrocution, this did not mean the legislature considered these other methods cruel or unusual. Kemmler may appear to be antiquated in light of current scientific knowledge, yet its standard need not be hostage to its history. Regardless, however, Kemmler could not serve as precedent under any Eighth Amendment analysis.

2. Courts' Use of Kemmler to Support General Propositions [FN470]

Numerous courts have cited Kemmler for a variety of general propositions: (1) 136 cases referenced Kemmler in the context of a general Eighth Amendment analysis; [FN471] (2) thirty-six cases incorrectly stated that Kemmler analyzed and applied the Eighth Amendment; [FN472] (3) fourteen cases included opinions correctly stating that Kemmler did not apply the Eighth Amendment; [FN473] (4) sixty cases discussed issues involving cruel and unusual punishment that did not pertain to a particular execution method or the death penalty; [FN474] (5) forty-two cases stated the proposition that *621 "punishments are cruel when they involve torture or lingering death;" [FN475] (6) forty-six cases used Kemmler to support the constitutionality of the death penalty; [FN476] (7) thirty-four cases, along with *Francis*, used Kemmler to support a particular proposition (e.g., the death penalty is not cruel and unusual under the Eighth Amendment); [FN477] (8) ten cases cited Kemmler in the context of the court's request for additional evidence, besides Kemmler, before determining whether a punishment was cruel or unusual; [FN478] (9) *622 eighty-one cases cited Kemmler in the context of analyzing the scope of the Fourteenth Amendment and whether the Eighth Amendment is applicable to the states; [FN479] (10) nine cases discussed the indefiniteness of the terms cruel and unusual; [FN480] and (11) nine *623 cases cited Kemmler for the proposition that courts defer to the state legislature in setting punishments for crimes and that courts only adjudge the punishments if they violate a constitutional prohibition. [FN481] Yet, *Harmelin v. Michigan* [FN482] differs, citing Kemmler for the proposition that the Cruel and Unusual Punishments Clause is a way judges oversee the legislature. [FN483]

This broad usage demonstrates Kemmler's impact on the law apart from the issue of electrocution. Furthermore, most of these cases were decided after *Robinson*, thereby making clear that *Robinson*'s holding had little if any effect on diluting Kemmler's precedential force. In light of Kemmler's influence and the evolution of Eighth Amendment jurisprudence, the next Part examines the problems state officials have encountered in applying electrocution in executions, and the evidence of electrocution's effect on the human body.

*624 IV. EVALUATING ELECTROCUTION AS AN EXECUTION METHOD

Presently, thirty-six states, [FN484] the federal government, [FN485] and the United States military [FN486] have death penalty statutes. [FN487] In widely varying ways, state statutes provide for one or more of five

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possible methods of execution: lethal injection, lethal gas, electrocution, hanging, or the firing squad. [FN488] The federal statute does not specify *625 a required method for federal executions, [FN489] however, and the military proscribes only one method, lethal injection. [FN490]

The diversity of the states' methods is primarily a function of federalism because the Constitution does not provide a method of execution. States therefore have exercised the freedom to adopt or change a particular method over time. [FN491]

Currently, eleven states authorize electrocution as their sole method of execution: Alabama, Connecticut, Florida, Georgia, Indiana, Kentucky, Nebraska, Ohio, South Carolina, Tennessee, and Virginia. [FN492] Statutes designating how electrocution is to be applied do not differ substantially from those at issue in Kemmler or Francis. Alabama's statute is typical: Where the sentence of death is pronounced against a convict, the sentence shall be executed ... by causing to pass through the body of the convict a current of electricity of sufficient intensity to cause death, and the application and continuance of *626 such current through the body of such convict shall continue until such convict is dead. [FN493]

The purpose of this Part is to evaluate the constitutionality of electrocution in terms of the available empirical and eyewitness evidence of its use. This evaluation is based on the Court's standard of cruelty set forth in Kemmler and the Eighth Amendment cases. Two questions frame this evaluation. First, is electrocution constitutional when it is administered properly? Second, is electrocution constitutional when it is administered improperly in a series of cases over time?

The evaluation includes an overview of the mechanics of electrocution, a description of the evidence of pain and mutilation, and a discussion of the financial and marketing aspects of electrocution as one explanation for its expanded use. This Part also examines evidence of negligence by states or by state officials through their faulty operation of electrocution equipment. This Part ends with an account of the rise and fall of Fred Leuchter, formerly the primary manufacturer of execution equipment in this country.

A. The Mechanics of Electrocution

Until recently, Fred A. Leuchter Associates, Inc., in Boston, dominated the modern design and creation of the electric chair, serving as this country's only commercial supplier of execution equipment and sole organizer of a training program for execution technicians. [FN494] Leuchter, the president of the company, created all types of execution equipment, including lethal-injection machines, gas chambers, gallows, as well as repaired, adapted, and installed electrocution systems and chairs. [FN495]

*627 From 1979 to 1990, Leuchter consulted with, or provided execution equipment for, twenty-seven states. [FN496] In a personal interview *628 with this author, however, Leuchter stated that he has at one time *629 or another consulted with an official in every state that has the death penalty. [FN497] Such a monopoly led one widely broadcasted television program to dub Leuchter "Dr. Death." [FN498]

As this Part later discusses, over time, Leuchter's expertise has been seriously questioned. [FN499] Regardless, his decade-long domination of the "execution business" existed for two reasons. First, he encountered little or no competition, and, second, Leuchter grew to know more about executions and execution equipment than anyone else in this country. [FN500] Whether his "knowledge" was accurate and reliable is open to debate. Again, however, one must consider his level of knowledge relative to the other available sources of expertise. For this reason, this Article includes Leuchter's descriptions of and testimony about electrocution devices, but with the necessary qualifications.

*630 1. Voltage and Application [FN501]

Methods of electrocution vary among states. [FN502] In general, however, the voltage used has increased over

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time. [FN503] A common procedure is first to apply a voltage of 2,000 to 2,200 at seven to twelve amperes, then reapply it at different intervals with lower voltage and amperage until the prisoner is dead. [FN504] For the last electrocutions in New York State during the 1960's, for example, [FN505] the executioner usually first applied 2,000 volts to the prisoner for about three seconds, then reduced the voltage to 500 volts for the next fifty-seven seconds. [FN506] At the start of the second minute, the executioner *631 raised the voltage again to 2,000 volts, lowered it, and then brought it back to 2,000 volts at the end of the second minute. [FN507] At this time, the executioner would shut off the current. [FN508]

When the executioner shuts off the current, an attendant wipes away the perspiration from the prisoner's chest so that the prison physician can listen for a heartbeat. [FN509] If the physician finds no heartbeat, the prisoner is pronounced dead. [FN510] If the physician hears heartbeats or observes a reflex, the executioner applies another shock. [FN511] For example, the 1953 electrocution of convicted spy Ethel Rosenberg required two more shocks than her husband's execution. [FN512] She required voltage for a total of four minutes and thirty seconds before she expired. [FN513]

According to Leuchter, a "good" electrocution system uses three electrodes. [FN514] An electrode on the inmate's head first introduces electricity to the body and the current then travels through the body toward two electrodes secured to the ankles. [FN515] "[G]ood circuit continuity at the electrode contacts" is important because tight electrical contacts "help reduce flesh burning." [FN516]

2. A Typical Leuchter Chair

A typical Leuchter chair applies 2,640 volts and five amperes of electrical current in two one-minute jolts. [FN517] According to *632 Leuchter, the first 2,640-volt jolt incites adrenalin activity within the prisoner's body, which probably keeps the inmate's heart beating. [FN518] The second 2,640-volt jolt, however, which Leuchter programs the chair to apply after a ten-second delay that allows the adrenalin to dissipate, stops the prisoner's heart. [FN519]

Leuchter emphasizes the importance of limiting the amount of current to under six amps. [FN520] Otherwise, the electrocution " 'cook[s] the meat on ... [the prisoner's] body. It's like meat on an overcooked chicken. If you grab the arm, the flesh will fall right off in your hands.' " [FN521] According to Leuchter, this circumstance does not suggest that the prisoner experiences pain as a result. [FN522] " 'It simply means that it's cosmetically not the thing to do. Presumably the state will return the remains to the person's family for burial. Returning someone who had been cooked would be in poor taste.' " [FN523]

Leuchter explains that he creates his new chairs and repairs old chairs to accommodate both the prisoner and the prison personnel. [FN524] For example, he uses simple parts to build his electrocution systems so that prison personnel can purchase replacement parts at local hardware and electrical-supply stores. [FN525] He also has replaced the leather harnesses on the old chairs with quick-release nylon seat-belts. [FN526] As he explained, " 'people who have been electrocuted smell bad, have burnt flesh, and are usually covered with urine and feces. Someone has to move the inmate's body out of the chair in this condition, and quick release belts will help shorten the time needed to complete the task.' " [FN527] A new taller backrest *633 secures the prisoner's head so it won't " 'bob around during execution.' " [FN528] Moreover, the helmets that accompany the chair have a denim mask that snaps across the prisoner's face so that he can " 'enjoy some degree of privacy' " during the execution. [FN529]

Leuchter prefers electrocution over other methods of execution because he thinks it is more humane. [FN530] " 'Basically, it's a matter of speed. If all goes well, it should take just 4.16 milliseconds [1/240 part of a second] to lose consciousness in an electric chair,' " [FN531] twenty-four times faster than the subject's conscious nervous system can record pain. [FN532] Yet Leuchter notes that most of the execution equipment he has inspected around the country is nearly a century old, and either in "questionable condition" or " 'downright defective.' " [FN533] For this reason, he does " 'not feel that all of the systems existent today are painless.' " [FN534] He believes

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however, that as a result of his efforts, "fewer people are tortured." [FN535]

According to Leuchter, then, if electrocution is applied properly, unconsciousness is instantaneous and the prisoner feels no pain. If it is applied improperly, which Leuchter says occurs in some state prisons, death is slow and can involve great pain.

B. Evidence of Unnecessary Pain and Physical Violence

Throughout the century, evidence of the existence or degree of unnecessary pain and physical violence associated with electrocution has been mixed. This Section examines scientific and eyewitness evidence to shed light on historical accounts.

1. The Early Years

Medical doctors, particularly Dr. George E. Fell, provided evidence of instantaneous death by electrocution, which significantly *634 swayed the Kemmler courts. [FN536] Dr. Fell's experiments constituted the only clearly documented evidence of immediate death caused by electrical shocks. [FN537] In his experiments, Fell observed how the hearts and lungs of dogs, with opened chest walls, reacted to the application of electric current. [FN538] He reported that the moment he applied the circuit, the normal rhythmical movement of the heart ceased and "became a mere mass of quivering flesh." [FN539] Based on this result he concluded that the circuit's effect was "electrically instantaneous," that electrical shock resulted in death, and that "nothing could be more sudden." [FN540]

Today, however, the heart activity that Fell reported appears to be ventricular fibrillation, [FN541] which does not necessarily produce instantaneous death or loss of consciousness. [FN542] Comparable experimentation on dogs resulted in the development of the defibrillator, [FN543] an agent, such as an electrical shock, that halts ventricular fibrillation and resumes the normal heart beat. [FN544]

*635 Fell also concluded that human beings had a high resistance to electricity that would produce a "cautery effect" that could be followed by serious burns if the current produced enough force. [FN545] Today, evidence suggests that this high resistance and cautery effect result in the continued consciousness and thus agonizing pain that some experts say electrocuted prisoners experience. [FN546]

Research on how electrocution causes pain also existed at the time of Kemmler's execution. According to Nicola Tesla, an expert who worked for both Edison and Westinghouse, [FN547] the alternating current may touch only one of four parts of the brain. [FN548] "In the meantime, the vital organs may be preserved; and pain, too great for us to imagine, is induced." [FN549]

Regardless of such early evidence, it appears that no one systematically examined the issue again until five decades later. At that time, Great Britain's highly influential Royal Commission on Capital Punishment ("Royal Commission") agreed with the Kemmler courts' assessments of electrocution, concluding that "unconsciousness is apparently instantaneous." [FN550] Although the prisoner's "leg *636 is sometimes slightly burned," the Royal Commission observed, the "body is not otherwise marked or mutilated." [FN551]

The Royal Commission reached this conclusion, however, only upon its inspection of electric chairs in Sing Sing Prison, New York, the District of Columbia Jail in Washington, and evidence on the chair's use in other states. [FN552] Moreover, the Commission primarily based its account of how an execution took place on the Washington prison's procedure, and failed to examine other methods of electrocution adequately. [FN553] Although the Commission noted cases in which the current was ineffectively weak, it did not elaborate on this subject because it focused primarily on the Washington procedure. No case of mishap was recorded in Washington, but it seems that in some other States there have been occasions when the current failed to reach the chair when the switch was engaged. Some States install an emergency generator in order that an execution may

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not be delayed by a failure of the commercial power. [FN554]

*637 The Royal Commission's Report and other authorities stating that execution was a painless and instantaneous procedure have virtually no scientific support. [FN555] Their authoritative stature likely resulted from their uniqueness at the time and the fact that no studies had gathered or offered countervailing evidence.

2. Recent Research

Advocates of electrocution argue that the method is painless. [FN556] Recent observations and research, however, indicate that electrocution causes severe burning that can lead to great pain. Prisoners evidence third and fourth degree burns where the electrodes come in contact with their scalps and legs, as well as burns on other parts of the body if they are part of a "botched" execution. [FN557] According to Harold Hillman, Director of the Unity Laboratory in Applied Neurobiology at the University of Surrey, [FN558] other factors, such as boiling body fluids, asphyxiation, and cardiac arrest, can also cause extreme pain: [FN559] [N]ot only are the burns at the point of contact severe, but the bodily fluids must have heated up to a temperature close to the boiling point of water to generate the steam, or wisps of smoke, which witnesses often note.... [M]uch smaller voltages of current are used in some countries for torture. Statements from victims *638 and experiments on volunteers in Denmark have shown that the larger the voltage applied, the more painful the torture.... [I]t is generally held by emergency care doctors, nurses, and first aid personnel, that electrocuted patients normally die of asphyxia and cardiac arrest. During asphyxia, a patient is unable to breathe, gasps for breath and finally suffocates. That asphyxia often occurs during execution by electrocution is supported by witness accounts in numerous executions in which they observed the prisoner gasping for breath between jolts of electricity. [FN560]

Other accounts of electrocution also suggest that the process involves considerable pain. L.G.V. Rota, a French scientist with "profound knowledge of electricity and its physiological effects," [FN561] concluded that he disbelieves that " 'anyone killed by electrocution dies instantly, no matter how weak the subject may be.' " [FN562] Although some prisoners have "greater physiological resistance than others," in individual cases the prisoner "may be alive and even conscious for several minutes without it being possible for a doctor to say whether the victim is dead or not." [FN563] "For the sufferer, time stands still; and this excruciating torture seems to last for an eternity." [FN564]

What really causes death is unclear. According to one physician, the "fit young men" who typify Death Row inmates can be "quite resistant" to electrical currents. [FN565] Although during electrocution every nerve is so stimulated it can no longer transmit impulses (e.g., the heart stops beating and breathing is interrupted), an individual's tissues may retain sufficient levels of chemical energy so that vital functions can resume. [FN566] Thus, necropsy reports show that the electric chair does not cause death by a fatal abnormality *639 of heart rhythm, but by massive electrical damage to the nervous system. [FN567]

Leuchter acknowledges in his Modular Electrocution System Manual, [FN568] a nineteen-page instruction manual for operating his electric chairs, that a failure to adhere to the manual's requirements "could result in pain to the subject and failure to achieve heart death, leaving a brain dead subject in the chair." [FN569] Furthermore, voltages of less than 2,000 volts, at saturation, cannot ensure heart death and are therefore inadequate because "they may cause unnecessary trauma to the subject prior to death." [FN570] Leuchter's account supports arguments that even a "routine" electrocution can cause torture and lingering death because of a number of factors: human error, together with lack of experience and knowledge; machine malfunction; or the particular characteristics of the prisoner, such as the prisoner's size, weight, or skin conductivity. [FN571]

According to some experts, the prisoner feels no pain despite the presence of burns and bodily mutilation. [FN572] Consistent with Leuchter, [FN573] they state that the electrical current impairs the prisoner's central nervous system more quickly than the system can register pain. [FN574]

Other experts emphasize that the human skull insulates the brain from an electric current. Because of the greater

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conductivity of the prisoner's skin tissues relative to his skull, most electricity passes from the electrode on top of the prisoner's head through his body to the electrode on his calf. [FN575] Therefore, even if 1,725 volts and seven amperes of electricity, directly applied, could disrupt central nervous functioning, the skull would insulate the brain from that level of current because electricity follows the path of least resistance. [FN576] The electrical current must penetrate the brain *640 to cause unconsciousness or to destroy nerve activity. [FN577] Thus, no study has offered tangible evidence that suggests that an electrocuted person may lose consciousness and all sense of pain immediately.

The electrical current, which stimulates each muscle to full contraction, produces the typical lunging forward that witnesses to an electrocution report. [FN578] According to Hillman, for this reason, the prisoner cannot react by any further movement even when the current is turned off for a short period of time and the heart is still beating, as has been demonstrated in numerous cases of execution by electrocution. It is usually thought that the failure of the convict to move is a sign that he cannot feel pain. He cannot move because all of his muscles are contracted maximally. A physiological effect that in itself is enormously painful and further prevents the prisoner from crying out or providing other outward signs of other massively painful effects of electrocution such as third degree burns and an enormous heating up of bodily fluids throughout the body.... While the subject remains conscious, strapped into the chair, paralyzed yet aware of the gruesome burning of his body, it is scientifically and medically certain that death is not instantaneous. [FN579]

*641 In many states, the more recent practice of administering a series of two or more electric jolts, then waiting to check the pulse, heightens the likelihood that death will have occurred by the time a physician checks for the heartbeat. [FN580] As the accounts of botched executions make clear, however, death often has not occurred even after the prisoner has received a series of electric jolts. Rather, witnesses have reported a substantial number of outward signs of life, such as gasps for breath, moans, and twitches of the hands. [FN581] Leuchter contends that some states, such as Florida, insert gags in the mouths of prisoners so that they are unable to cry out under the hood that they wear. [FN582]

According to Orrin Devinsky, M.D., Professor of Neurology at the New York University Medical Center and the Chief of Neurology at the Hospital for Joint Diseases, [FN583] examining the effects of electricity on the brain resulting from all kinds of causes, e.g., lightning, electroconvulsive therapy, accidental electrocutions, and intentional electrocutions, is informative. [FN584] He claims that precisely determining the extent of suffering individuals experience during intentional electrocutions is impossible because the subjects die. [FN585] Research on persons who have survived accidental electrocutions, *642 however, indicates that during an intentional electrocution, an individual is very likely to: (1) experience intense pain; (2) not die instantly; (3) evidence serious emotional trauma; (4) lose an accurate perception of time during the incident so that a brief electric shock may seem to last for a very long period of time; and (5) not lose consciousness. [FN586]

No study, however, definitively determines whether intentional electrocution causes immediate brain death or physical discomfort. [FN587] Moreover, none of the criteria that physicians use to determine brain death for the purpose of removing life supports has been present immediately after the application of the electrical current in an intentional electrocution. [FN588]

Substantial evidence indicates, however, that the effects of electrical current differ among individuals, including the interval between the initial electrical shock and the time of brain death, cardiac arrest, and pulmonary arrest. [FN589] These differing effects are due to a range of factors: (1) skin resistance (which depends upon the extent of sweat, oil, hair, and skin thickness); (2) skull thickness and resistance (which can prevent much of the electrical charge from reaching the brain); (3) the type of electrode used for stimulation; and (4) the type and amount of conductive solution used. [FN590] *643 "The result of these factors is that some individuals who are exposed to certain current will experience significantly different physiological reactions based on the factors of resistance as well as individual variability of the brain and internal organs to the effects of electrical stimuli." [FN591]

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C. Evidence of Mutilation

States vary with respect to procedures on requiring or documenting post-execution autopsies. Unlike other states, for example, Louisiana does not require post-execution autopsies. [FN592] Thus, no scientific information is available on the physical condition of prisoners who die in that state's electric chair. Florida, on the other hand, does require post-execution autopsies. [FN593]

Witnesses' recorded descriptions of mutilation are also available. Some of the most extensive, earlier accounts appeared in *The Angolite*, this country's only uncensored prison magazine, which has won numerous journalism awards for its documentation of life in the Louisiana state penitentiary known as Angola. [FN594] In an issue devoted solely to electrocution, [FN595] *The Angolite* printed a description of the body of Wayne Robert Felde, who died in Louisiana's electric chair in 1988. [FN596] The witness who provided the description was Felde's sister, a veteran nurse with fifteen years experience as *644 an Emergency Room Supervisor who had witnessed numerous electrical burns. [FN597] She stated that she was "shocked at the extent of the burning on Wayne's body." The burns were severe: third and fourth degree burns with sloughing, "meaning the skin had literally come loose from his body and was sliding," she said. Felde's ear was badly burned. "Chunks of skin, about four centimeters in diameter had been burned off the left side of his head, toward the front, revealing the skull bone," she added. The burn to her brother's calf, at the point of contact of the leg electrode, was "gaping and oozing." She stated the leg was so badly mutilated that "it had been necessary to enclose that portion of his calf in a zipped plastic sleeve, with some sawdust-like material, to absorb and prevent draining of the burn." [FN598]

Leuchter provided additional information concerning Louisiana's electrocution of prisoners. [FN599] He stated that in 1987, a warden at Angola informed him about his difficulties with an electrocution in 1984. [FN600] When the technician applied the first jolt of electricity, the prisoner screamed. [FN601] The warden later discovered that "the burn at the leg electrode went straight through to the bone." [FN602] Leuchter informed *The Angolite* that he had been aware of other problems, but that getting information was too difficult "because no post-mortem photographs are taken and there is reluctance in releasing the necropsy reports." [FN603]

Theodore Bernstein, a nationally known electrical engineer, obtained additional information regarding the effectiveness of Angola's chair. [FN604] In 1990, Bernstein inspected the design and functioning *645 of Angola's electric chair. [FN605] He confirmed Leuchter's conclusion that "numerous aspects of electrode design 'contributed to excessive, completely unnecessary burning of the person being executed.' " [FN606] As he noted in an affidavit, [t]he buckle on the wet straps is too close to the flesh and acts as an additional conducting path to cause burns at the buckle. The buckle and leather cause arcing of the electrical current to other areas of the flesh, resulting in additional burns. The sponge utilized is too thin and therefore does not spread the current uniformly over a sufficient area, which leads to greater burns. The rough underside of the electrode and the sharp edges of the metal, as constructed, burn right into the skin because of the close spacing permitted by the thin sponge. [FN607]

Bernstein concluded that the inadequate electrodes would continue to cause "excessive burning and mutilation." [FN608]

The evidence of mutilation again prompts a comparison between *Kemmler* [FN609] and the present day. In *Kemmler*, the Supreme Court considered burning at the stake "cruel and unusual." [FN610] In his dissenting opinion in *Glass v. Louisiana*, Justice Brennan contended that death by electrocution is the "technological equivalent." [FN611]

D. Evidence of Negligence by the State or State Officials

In *Kemmler*, the Court validated the use of electrocution assuming that a state would properly apply it. [FN612] Post-execution commentary *646 on electrocutions since the *Kemmler* decision has indicated that states have not applied electrocution properly. [FN613]

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In *Francis v. Resweber*, [FN614] the Court assumed "that the state officials carried out their duties under the death warrant in a careful and humane manner" because no information on the record suggested otherwise. [FN615] Yet later evidence revealed that the individual operating the electric chair was completely ignorant about electricity. [FN616] The only person prison officials assigned to assist him in setting up the chair was a prisoner who claimed some knowledge of electricity. [FN617] In requesting a remand of the case to the Supreme Court of Louisiana so that they could properly develop such facts, Francis' attorneys made one further point: the state legislature, reacting to the lack of qualifications of those operating the chair, changed a provision in its Code of Criminal Procedure to require that the electric chair operator be "a qualified electrician." [FN618]

This Section examines examples of error by the State or state officials in their operation of electrocutions. It focuses in particular on the recent cases of two death row inmates, Herbert R. Bassette, Jr. in Virginia and Jesse Joseph Tafero in Florida. This Section concludes with an examination of the exposure of Leuchter's lack of training, throwing further doubt on the effectiveness of execution equipment and procedures in this country.

1. Bassette in Virginia: Risking Two-Out-of-Three Bungles

In *Bassette v. Commonwealth*, [FN619] Bassette, who was eventually removed from death row, [FN620] challenged the constitutionality of Virginia's use of the electric chair for three reasons. [FN621] First, Bassette contended that a botched electrocution was highly foreseeable because two out of the last three electrocutions in Virginia had been *647 bungled. As a result of the mishaps, the State had declared a policy of administering two separate, two-minute series of jolts in the event that the prisoner outlived the first series. [FN622] This change suggested that the State thought it foreseeable that the prisoner would survive after the first attempt at death. [FN623] Second, Bassette questioned the State's ability to operate the electric chair. [FN624] No written instructions provided guidance as to the voltage, amperes, cycles, or duration of electrocution, and there appeared to be no training and qualifications for executioners. [FN625] Lastly, Bassette presented evidence that electrocution entailed a slow, painful death and mutilation. [FN626]

As part of his case, Bassette submitted a Freedom of Information Act request for data concerning the construction of the electric chair, its parts, and the qualifications of execution personnel. [FN627] Bassette noted that the State refused to provide any sketches, blueprints, diagrams, photographs, or any other additional information on the chair, thereby limiting his ability to examine whether the chair contained defects or other problems that would heighten the likelihood that the chair would malfunction. [FN628] Indeed, the only information that the State would release regarding the chair [FN629] was an autopsy report on the electrocution of John Evans in Alabama, who received a number of severe burns, including burns not related to contact with the electrodes. [FN630]

Bassette also noted inadequacies in the training manuals for corrections personnel, which failed to explain how a technician should *648 perform an execution. [FN631] Moreover, the manuals did not provide the executioner with any instruction in the event of a malfunction. [FN632] Bassette was concerned that the Director of Corrections would have the discretion to vary the voltage, number of cycles, and duration of the administration of the electrical circuit, yet he would be incompetent to make such judgments. [FN633] Bassette contended that this lack of knowledge explained Virginia's record of botched executions, both before the electric chair's rewiring (two botched electrocutions out of eleven, or eighteen percent) and after its rewiring (one botched electrocution out of two, or fifty percent). [FN634]

Virginia attributed its decision to rewire the chair to complaints that its electrocution equipment was antiquated. [FN635] Virginia prisoners built the electric chair, originally named "Old Sparky" by corrections officials, in 1908 from an old oak tree. [FN636] From 1908 to 1990, the chair remained unchanged, [FN637] despite an obvious mishap when the state electrocuted Frank Coppola in 1982. [FN638] The public eventually became aware of such botches when, during the electrocution of Wilbert Lee Evans seven years later, the media witnessed *649 blood spurting from Evans' nose and eyes [FN639] while "officials in the chamber cringed and looked horrified." [FN640]

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In response to the Evans botch, Virginia rewired "Old Sparky" in December 1990 so that it now can deliver, for ten seconds, 1,725 volts of electricity at seven amps from the electrode located on the prisoner's head to another electrode on his calf. [FN641] The operator then applies an electrical charge for one minute of 240 volts at one amp. [FN642]

According to experts familiar with the effects of electricity on the human body, this method is likely to cause inmates conscious suffering and torment due to a number of factors. [FN643] Indeed, after the new wiring, the electrocution of Derick Peterson required thirteen minutes, [FN644] a result that Department of Corrections officials attributed to their need to "adjust" to new equipment. [FN645]

Virginia's Department of Corrections also has questioned the humaneness of electrocution, noting arguments in favor of lethal injection. [FN646] The Courts of Justice Committee of the Virginia House of Delegates passed a lethal injection bill, but the bill never reached the floor for a vote of the full house. [FN647] The bill would have given death row inmates a choice in their method of execution. [FN648]

*650 2. Tafero in Florida: "This Electric Chair Works Fine If You Are a Colander" [FN649]

Tafero's execution at the Florida State Prison perhaps provides the most compelling example of state negligence for various reasons: (1) the actual execution was particularly gruesome; [FN650] (2) almost none of the officials at the Florida State Prison who were involved in the maintenance and operation of the electric chair had any formal education in electricity or engineering; [FN651] (3) the press and attorneys ridiculed later experiments demonstrating why the chair malfunctioned and why it would be safe in the future, even though the court eventually found the State's conclusions from these experiments acceptable; [FN652] and (4) the State attributed its bungling of Tafero's execution to oversights which it should have anticipated. [FN653]

Florida corrections officials were aware of the problems with electrocution from accounts of Alabama's botched execution of Horace F. Dunkins. [FN654] They said such a malfunction at Florida State Prison would be unlikely because they "do everything possible to make sure it does not." [FN655] For example, every day for the last five days leading up to the execution "all electrical equipment is checked, including the emergency generator." [FN656]

The various theories explaining the problems with Tafero's execution are worth examining further. The first theory was that a broken electrode considerably reduced the strength of the current through his body. [FN657] According to Leuchter's affidavit sworn for the appeal of Judias Buenoano, [FN658] Florida's prison electrician and superintendent consulted Leuchter in 1986 about defective leg and *651 head electrodes that they thought were in "questionable" condition. [FN659] Leuchter asserted that the prison officials rejected as too expensive his estimate of \$3,425 for a leg stock with two electrodes and a replacement helmet. [FN660] Instead, they requested that he create a leg electrode from an old army boot and a copper strip, [FN661] suggestions he rejected as being "inadequate for a competent execution." [FN662]

Robin Adair, an electrical supervisor at the Florida State Prison from 1986 to 1987, confirmed Leuchter's testimony concerning the homemade leg electrode. Adair assembled the contraption at the request of his supervisors. [FN663] Adair also stated that "numerous" prison officials responsible for the maintenance and operation of the electric chair "have no formal electrical education or training." [FN664] He emphasized the Florida State Prison's "unwillingness to make any expenditure of funds to obtain professionally made components for the electric chair or to conduct more than limited maintenance and inspection on the chair." [FN665]

The second theory explaining the bungling of Tafero's execution, and the one officials ultimately tested, focused on the type of sponge used in the headpiece of the electric chair. In the twenty-one executions since Florida's reimposition of the death penalty, no one had replaced the natural ocean sponge in the headpiece. [FN666] When Department of Corrections workers discovered that the natural ocean sponge in the headpiece was

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worn and dirty, they replaced it with an ordinary household sponge. [FN667] This type of sponge resisted the electricity pumped through it, which suggests that Tafero may not have received a sufficient amount of electricity *652 to kill him quickly. [FN668] Moreover, the sponge burst into flames with each jolt of electricity. [FN669]

Because of the negative publicity following Tafero's execution, Department of Corrections workers developed a test to determine whether the sponge was at fault. [FN670] They placed a piece of the sponge from Tafero's headpiece in a common household toaster and subjected it to 120 volts of electricity. [FN671] Because the sponge then omitted a noxious odor, Department officials concluded that the sponge was at fault in the Tafero botch. [FN672] However, this test did not satisfy the Eleventh Circuit Court of Appeals, which had refused to allow Florida executions to proceed until the State provided proof that the chair would not torture anyone else. [FN673]

Florida's governor then ordered an independent examination of the chair. [FN674] Mike Morse, an associate professor of electrical engineering at Auburn University, conducted the testing. [FN675] Morse created a "makeshift inmate" whose head was a metal colander, whose body was a rubber tub of saline solution, and whose leg was a piece of pipe. [FN676] Morse explained that the rubber tub "simulated the resistance the body offers to electricity because ... we are all bags full of liquid." [FN677]

In July 1990, Morse strapped the "inmate" to the headpiece of the electric chair in the death chamber at Florida State Prison. [FN678] He then attached electrodes to the "head" and "leg," and applied a 2,000-volt jolt of electricity. [FN679] The fifteen minute demonstration *653 "caused a noisy buzzing" [FN680] while journalists, state officials, representatives of the General Electric Company, and officials from departments of corrections in Virginia and South Carolina observed. [FN681]

Morse deemed the test a grand success. According to Morse, " '[i]t was a picture-perfect demonstration.' " [FN682] He explained that he had engaged in similar tests a few days earlier using the same kind of synthetic sponge at fault in the Tafero execution. [FN683] When jolted, the sponge caused " 'electrical arcing, flames and sparks.' " [FN684] Morse concluded that the chair was now functioning properly and now would be lethal at the first application of the electric current. [FN685]

The press and other commentators, however, ridiculed the experiment, [FN686] contending that defense attorneys would "have a picnic with the colander-pipe-tub test." [FN687] They expected the test would further delay the execution status of three condemned inmates who had won indefinite stays from the Eleventh Circuit, relying on arguments that the electric chair was defective. [FN688]

Yet, on July 27, 1990, the United States Supreme Court upheld the Eleventh Circuit's three-judge panel ruling [FN689] that had affirmed a Florida federal judge's conclusion that the chair's 2,000 volts are "sufficient to cause painless termination of life." [FN690] Because the Department of Corrections had stated, based upon expert testimony, that the various tests of their electric chair were successful, the courts ruled that executions could continue. [FN691] The courts *654 therefore failed to consider further indications of error by the Department of Corrections by accepting the Department's simple engineering experiment employing a colander-headed inmate.

E. Fred Leuchter Is Condemned

A brief account of Leuchter's career gives another perspective on states' ignorance of proper execution methods. This Section describes Leuchter's business, how he lost it, the dearth of expertise on execution techniques in the past and present, and the consequences of this lack of expertise.

1. The Cost and Marketing of Execution Methods

According to Leuchter, his annual income was about one-quarter of a million dollars at the peak of his execution business. [FN692] Although he had no competition, he still devoted considerable time and effort to soliciting business. [FN693] This effort entailed maintaining close contact with prison wardens in every death

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penalty state, inquiring annually about their execution-equipment needs, and attending conventions held by correctional personnel where he would advertise his equipment with photographs and blueprints. [FN694] As one commentator noted, Leuchter's "chilling promotional literature reads like an advertisement for the latest dishwasher": [FN695] " 'Enclosed is a description of our Modular Electrocution System, the only state of the art system available today. This system will minimize your problems and ensure trouble free electrocutions.' " [FN696]

According to Leuchter, cost factors do not usually influence a state's choice of a particular execution method. [FN697] However, costs varied considerably among the different methods. [FN698] Based on *655 Leuchter's estimates in 1990, the electricity required for electrocution in a Leuchter chair cost thirty-one cents. [FN699] The chemicals needed for a lethal injection, however, cost about \$600 to \$700, [FN700] whereas the sodium cyanide pellets used in a gas-chamber execution cost about \$250. [FN701]

The cost of the hardware also varied. Excluding the price of installation, the least expensive execution method was the Leuchter company's lethal-injection system which cost \$30,000. [FN702] The Leuchter electrocution system cost \$35,000, the Leuchter gallows, \$85,000, and the Leuchter gas chambers nearly \$200,000. [FN703] Before 1990, states were increasingly adopting Leuchter's \$100,000 "execution trailer" which provided a lethal-injection machine, a steel holding cell for the prisoner, and additional areas for witnesses, the chaplain, prison employees, and medical personnel. [FN704] These costs do not include the salaries of the "execution technicians" who may be involved in the process. [FN705]

Leuchter's personal manufacturing costs for such equipment appear minimal. He manufactured all his equipment "in the dusty basement of [his] tiny house in Massachusetts." [FN706]

2. "Dr. Death" Is No Dr.

Leuchter's grip on the execution industry came to a halt in 1990 after a series of events destroyed his business and reputation. His problems began when he gained attention through his published articles and expert testimony proposing that the number of deaths *656 in the Holocaust had been exaggerated. [FN707] He also claimed that the Nazis could not have used gas chambers to kill six million Jewish people. [FN708]

The most controversial of his articles on the Holocaust, however, was The Leuchter Report. [FN709] Leuchter received \$37,000 in advance to prepare the report in 1988 in conjunction with the defense of Ernst Zundel, a German-Canadian neo-Nazi who was on trial in Canada for violating Canada's "spreading false news" statute. [FN710] The prosecution based its charges on Zundel's publication of the pamphlet, Did Six Million Really Die? [FN711] Both Zundel and the pamphlet challenged the view that the Nazis exterminated six million Jews during World War II, predominantly through the use of gas chambers employing hydrocyanic gas (Zyklon B gas). [FN712]

Leuchter's testimony in Zundel's trial on April 20, 1988, was damaging personally because it revealed his complete lack of engineering credentials. [FN713] The prosecutor established that Leuchter held only a bachelor of arts degree (in history), which he received in 1964, and nothing more. [FN714] Regardless, in early 1989, Leuchter *657 was a featured speaker at the Ninth International Revisionist Conference. [FN715]

Another year passed, however, before information on Leuchter's lack of credentials had any impact in the United States. Indeed, "[i]n an admiring look" at Leuchter in May 1990, the ABC News program, Prime Time Live, introduced him as this "country's reigning expert on execution." [FN716] That same month, the Anti-Defamation League of B'nai B'rith revealed that in his testimony for Zundel, Leuchter had denounced Hitler's extermination of Jews in gas chambers as a "myth." [FN717] Leuchter countered that he was simply speaking as an expert witness, not as a Nazi sympathizer. [FN718]

Leuchter's statements had a devastating effect on his business. [FN719] In August 1990, Alabama's Attorney

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General sent a letter to all capital punishment states throwing doubt on Leuchter's credentials [FN720] and warning them that Leuchter would provide expert testimony for death penalty opponents in those states that had refused his offers to perform consulting work. [FN721] He also openly questioned Leuchter's expertise. [FN722] In addition, Dr. Edward A. Brunner, chairman of the anesthesia department at Northwestern University Medical School, stated that Leuchter's lethal injection machine would prevent an inmate from communicating about the extreme pain caused by potassium chloride, one of the injected chemicals. [FN723] Apparently, both Alabama and Illinois were concerned *658 that their methods of execution would undergo challenges that they constituted cruel and unusual punishment under the Eighth Amendment. [FN724]

As a result, on August 17, the Illinois Department of Corrections ended Leuchter's contract for execution support. [FN725] A letter from Leuchter followed quickly, stating that because there was no longer a contract, he would assume no responsibility if the machine failed. [FN726] He stressed that the machine " 'has an intermittent functional problem and may very likely fail during the execution.' " [FN727]

Leuchter did not actually face charges of practicing engineering without a license until October 23, 1990. [FN728] The complaint of a member of the Albany, New York group, Holocaust Survivors and Friends in Pursuit of Justice, to Massachusetts authorities that Leuchter did not have proper engineering credentials instigated this charge. [FN729]

Rather than face charges of practicing engineering without a license, a violation of Massachusetts law, Leuchter filed a consent decree with a Massachusetts court on June 11, 1991. [FN730] In the decree, *659 Leuchter admitted that he is not and never has been registered as a professional engineer. [FN731] Moreover, he acknowledged that he had represented himself as an engineer to various states when he provided equipment or advice for their death penalty practices. [FN732] He also agreed to stop distributing reports claiming that he was an engineer, most particularly, The Leuchter Report. [FN733]

Under this settlement, Leuchter avoided trial, a maximum fine of \$500, and three months in jail. [FN734] He received a sentence of two years probation after agreeing to stop practicing engineering without a license. [FN735] He may give, however, opinions "on everything from the Holocaust to capital punishment, as long as he does not present himself as an engineer." [FN736] Whether Leuchter is liable for misrepresentation to those states to whom he sold execution equipment *660 is open to question. [FN737] Currently, Leuchter claims that he gets little work. [FN738] "Wardens nearly everywhere shun him." [FN739]

Although Holocaust survivors' groups were the source of Leuchter's legal troubles, [FN740] Leuchter's views on the Holocaust are not what damned him as the creator of execution devices. The Holocaust groups merely revealed his lack of credentials. Without their efforts, Leuchter's execution methods would likely have remained on the market as they had for over a decade. Leuchter's strong links to neo-Nazis and participation in anti-Holocaust rallies, however, most likely ensured the continuing demise of his execution business. [FN741]

*661 3. Are We Condemning the Messenger?

We might want to question what the condemnation of "Dr. Death" accomplishes. As one editorial explained, "[s]uch vigilance is prudent, but it smacks of executing the messenger. Mr. Leuchter, after all, only designs death machines; others create their market." [FN742]

Moreover, his loss is significant if for no other reason than that no one else has replaced him. States that have not enforced the death penalty for a long time have difficulty finding executioners. *662 [FN743] Other states have trouble locating technicians who can repair or replace electric chairs, or construct lethal injection machines. [FN744] The numbers of botched executions that have occurred within recent years accentuate the need for experts. [FN745]

Recent decisions emphasize the significance of such matters. In addressing the problem of faulty equipment in

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Buenoano v. Dugger, [FN746] for example, a Florida court contended that the State should not be responsible. [FN747] "The State is not required to employ the most modern state of the art technology in implementing the death penalty or to foresee and meet every problem which conceivably ever could arise during an execution." [FN748]

One question that arises is, how far should the reasoning of the Buenoano decision extend? The next Part examines a series of botched executions in an attempt to frame an answer.

V. POST-GREGG BOTCHED ELECTROCUTIONS

According to Michael Radelet, a sociology professor at the University of Florida, nearly nine percent of all executions since Gregg v. Georgia, [FN749] in which the Supreme Court reinstated capital punishment, have been botched. [FN750] Radelet's estimate is difficult to validate, however, because executions are not observed so systematically that one can always determine whether a botch has occurred. [FN751] For example, until 1988 the Commonwealth of Virginia *663 barred the media from witnessing executions. [FN752] Since the time that witnesses have been present, a grossly disproportionate number of Virginia's electrocutions have been botched. [FN753] For this reason, Radelet's and others' estimates may underrepresent the number of botches that have occurred during the last fifteen years simply because they were not observed by the media.

Some evidence suggests that botches may have occurred even more frequently before Gregg, when executions were less visible and open to scrutiny. [FN754] Any pre-Gregg estimate of botches, however, would also be unreliable because the media did not witness executions routinely. [FN755] The newspapers did not report the Willie Francis botch, for example, and the circumstances surrounding the execution became widely known only because they were the subject of a Supreme Court case. [FN756]

A number of reasons exist for documenting botched electrocutions. First, botches provide evidence of unnecessary pain, physical violence, and mutilation. Because a sizeable number of reporters witnessed recent executions, such as Tafero's, their pooled accounts enhance the reliability of the events that occurred. Second, botches can demonstrate error on the part of state officials when they continue over time and appear attributable to the same factors. Arguably, officials have reason to know that such botches can occur, yet they take few or no precautions to prevent them.

*664 A. Botched Electrocutions: 1979-1989

1. John Spenkelink (Florida, May 25, 1979)

Spenkelink was the second person to be executed, but the first to be electrocuted, after the Supreme Court lifted its capital punishment ban in 1976. [FN757] Spenkelink received three separate jolts of electricity and five minutes lapsed before his death. [FN758] After the first jolt, "[t]he flesh on Spenkelink's right leg seared, by one account, and smoke rose into the death chamber. A few inches below the electrode cuff on his calf, there was a three inch wound. It looked as if his skin had split, but there was no blood." [FN759] "Witnesses said that, in seconds, puffs of smoke came from his legs and his hands began to blacken." [FN760]

Because the doctor stated that Spenkelink was not yet dead, the executioner applied two additional surges. [FN761] According to State Representative Andy Johnson, one of the witnesses, "'[w]e saw a man sizzled and sizzled again.'" [FN762]

2. Frank J. Coppola (Virginia, August 10, 1982)

The public was not aware of Coppola's botch because no media representative was present to report it [FN763] and corrections officials never released the details of the execution. [FN764] According to one attorney's account, Coppola received two separate jolts of electrical current, each lasting about fifty-five seconds. [FN765] The

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second jolt *665 produced flames, smoke, and burning flesh when Coppola's leg became inflamed. [FN766] During the second application of current, smoke began to flow from Mr. Coppola's head and leg. Soon, flames erupted from Coppola's leg near the site of the leg electrode. This flame and smoke continued until the current was turned off. ... I observed smoke rising to the ceiling in sufficient amounts to fill the entire death chamber with a smoky haze.... Although I was in an isolated booth with other witnesses separated from the death chamber by glass and wall, I could smell an acrid odor that I assume was the smell of burning flesh. During the second application of current, a sizzling sound could be heard that sounded like cooking flesh. ... Shortly after Mr. Coppola's leg caught on fire, the Commonwealth turned the current off. Within minutes, a medical examiner pronounced Mr. Coppola dead. [FN767]

3. John Louis Evans III (Alabama, April 22, 1983)

Evans' execution in Alabama's Holman prison was one of the most grotesque, [FN768] resembling Tafero's in many respects. According to Evans' attorney, Russell Canan, who witnessed to the event: At 8:30 P.M. the first jolt of 1,900 volts of electricity shot through John's body. It lasted 30 seconds. Sparks and flames erupted from the electrode tied to his leg. John's body slammed against the straps holding him in the chair, and his fists clenched. The electrode burst from the strap holding it in place and caught on fire. A large puff of grayish smoke and sparks poured out from under the hood that covered his face. John's body straightened out and quivered. An overpowering stench of burnt flesh and clothing began pervading the witness room. When the current stopped, he fell back into the chair. The two doctors went into the chamber to pronounce him dead. One doctor put the stethoscope on his heart. He turned and nodded to us, the usual sign that a person is dead. But he *666 meant the opposite, that he had found a heartbeat. The other doctor examined John and confirmed it. The doctors left the execution chamber. The guard reattached the electrode to John's leg and fixed the strap. He set up the power lines again. John's chest rose evenly as he continued breathing. A gush of saliva oozed from his face and out from the black hood onto his white prison clothes. John's breathing was slow and regular. Mark Harris, the reporter, said out loud, "He's survived." At 8:34 the second jolt of 1,900 volts of current was sent into John's body. The stench of burning flesh was nauseating. More smoke came from his head and leg. John's hands gripped the arms of the chair. Again, the doctors examined John. Again, they reported that he was still alive. It was all out of control. Commissioner Smith did not know what he was doing. Warden White was walking from the generator to the execution chamber. I called out to Smith: "Commissioner, I ask for clemency. This is cruel and unusual punishment. Communicate that to the Governor." Smith ignored me. Again, I made my plea. "I'm his lawyer. I ask for clemency." Smith's eyes appeared to be tearing. This time he spoke into the phone and informed [Governor George] Wallace of my request. Meanwhile, they prepared the chair for the third attempt. Warden White opened the door to the witness room, and Smith said: "Hold everything. They're asking for clemency." Minutes later Smith announced: "The Governor will not interfere. Proceed." They were ready for the third jolt. Once again another charge of electricity was sent through John's body. Once again, his head and leg boiled. There was more smoke and sparks. Rick [a colleague] and I held hands in horror. This jolt lasted 30 seconds. At 8:44 the doctors pronounced him dead. His body was charred and smoldering. The execution of John Evans took 14 minutes. [FN769]

According to another account of the execution: *667 Evans was tortured to death. The gruesome process took the better part of an hour, while officials tried to make the electric chair "work" and while attorneys and politicians argued over Evans' half-dead body. It took three 30-second charges of 1,900 volts to kill Evans, eventually. At the first, the electrode on his left leg exploded in fire and smoke, and flames burned around the black shroud over his head. Even a second charge did not kill him. It was not until after the third jolt of electricity that the heart in his battered body finally stopped. [FN770]

4. Alpha Otis Stephens (Georgia, December 12, 1984)

After experiencing one two-minute jolt of 2,080-volt electricity, Stephens slumped. [FN771] Soon thereafter, however, witnesses said that he struggled to breathe. [FN772] During the six minutes doctors waited for his body to cool so they could examine it, he took about twenty-three breaths. [FN773] Stephens died after receiving the

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second two-minute, 2,080-volt current. [FN774] Altogether, eight minutes lapsed before the second jolt caused his death. [FN775] A prison spokesman said that " 'apparently there is no malfunction,' " in the electric chair, but added that "prison officials intended to find out why it took two charges to kill Mr. Stephens." [FN776]

5. William E. Vandiver (Indiana, October 16, 1985)

Vandiver's execution required five jolts of electricity from the seventy-two year old electric chair. [FN777] A witness stated that Vandiver continued to breathe after the first two jolts of 2,300-volt *668 current, and the doctor did not pronounce him dead for over seventeen minutes after electricity was first applied to his body. [FN778]

A prison spokesman stated that the execution " 'did not go according to plan.' " [FN779] Some witnesses commented that "the technical problems inhumanely prolonged the execution." [FN780] According to Vandiver's attorney who witnessed the execution, " '[w]hat I saw initially was smoke coming from someone's head. There was a tremendous smell of burning in the room. Ultimately, the fans had to be turned on.' " [FN781] He noted that Vandiver was sitting with his fists clenched when he was initially strapped into the chair, and that his fists remained clenched throughout the execution. [FN782]

The physician who determined death commented that " '[t]his is very rare,' " [FN783] noting that Vandiver should have died after the first jolt. [FN784] The Department of Corrections spokesperson explained that " '[t]he chair has been used 61 times ... and has never failed, except sometimes it needs more than one application.' " [FN785] Indeed, in 1961, the same chair required six jolts to kill Richard Kiefer, another Indiana inmate. [FN786]

B. Botched Electrocutions: 1989-1992

1. Horace F. Dunkins (Alabama, July 14, 1989)

Witnesses stated that Dunkins, who was mentally retarded, took nineteen minutes to die in Alabama's electric chair "when it failed to deliver a single killing jolt." [FN787] Ultimately, two jolts, nine minutes *669 apart, caused his death. [FN788] Dunkins' attorney described the execution as "brutal." [FN789]

When the fact that Dunkins had not received a sufficient amount of electricity in the first jolt had become clear, a prison guard captain opened the witness room door announcing, " 'I believe we've got the jacks on wrong.' " [FN790] Electricians had to wire the faulty cables, which created insufficient current, between jolts in order for the electrocution to proceed. [FN791]

Bernstein, the nationally known electrical engineering expert, [FN792] consulted prison officials about the Dunkins execution. He confirmed that the electrical jacks were improperly connected and that no electricity appeared to have reached Dunkins' chair initially. [FN793]

Alabama Prison Commissioner Morris Thigpen commented at the time, "I regret very, very much what happened. It was human error. I just hope he was not conscious and did not suffer." [FN794] Thigpen explained that four probes are connected to a wall outlet; two of the four probes that were connected to the electric chair, one being attached to the inmate's left leg and the other to his skull had been switched. [FN795] These improper connections prevented the normal surge of electricity from reaching the chair. [FN796]

Although a private electrician had tested the chair for its reliability, Thigpen noted that " '[y]ou can get some reading from the tests, but there is no way to know if they are accurate.' " [FN797] As one commentator emphasized, "[o]fficials have not removed all chances for a repeat of the error that forced officials to send a second surge of electricity to kill Dunkins because the electrodes must still be *670 attached to the proper probes in the chair for an execution and could be improperly attached." [FN798] Indeed, the press remembered that

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Alabama's electric chair, nicknamed "Yellow Mama," had also malfunctioned in 1983 when John Louis Evans III required three jolts of electricity before doctors pronounced him dead. [FN799]

2. Jesse Joseph Tafero (Florida, May 4, 1990)

Executioners needed to apply three 2,000-volt jolts in order to execute Tafero. [FN800] Even after an application of two high voltages of electricity, Tafero continued to breathe deeply and sporadically. [FN801] He died after a third jolt and seven minutes. [FN802] Tafero's execution was one of the most gruesome [FN803] and most negligent. [FN804]

3. Richard T. Boggs (Virginia, July 19, 1990)

Boggs required two fifty-five second applications of 2,500-volts of electricity. [FN805] According to one source, he did not die after the first application. [FN806]

4. Wilbert Lee Evans (Virginia, October 17, 1990)

According to accounts by witnesses and reporters, at the application of the first two fifty-five second, 2,400-volt jolts of electricity, blood "poured" from Evans' eyes and nose. [FN807] "[W]ithin seconds, Evans' shirt was drenched in blood." [FN808] The Reverend Russell Ford described the event as follows: "[T]here was a sizzling sound as air spilled from Evans's lips...." He was covered with blood. When I looked at him, you could see that air was being *671 forced out of his body through his lips. It was somewhat like the sound a pressure cooker makes." [FN809] In addition, Evans "appeared to give an audible moan or groan when the electricity was first applied, suggesting he may have suffered initially." [FN810] According to Tim Cox, a United Press International reporter, "[i]t was kind of unsettling because we weren't prepared for it." [FN811]

Initially, prison officials stated that Evans merely suffered a nosebleed caused possibly by his head jerking against the mask during the first jolt. [FN812] A prison spokesperson also suggested that the death mask may have been too small for Evans' nose and physical features; he was six feet, three inches tall and weighed 258 pounds. [FN813] Officials later declared that Evans' high blood pressure, due to his heavy consumption of pork prior to the execution, had caused the bleeding from his eyes and nose. [FN814] These officials provided no explanation for Evans' moaning, other than Leuchter's comment that the sound could have been attributed to " 'a contraction of the diaphragm forcing out air.' " [FN815]

When asked if Evans had experienced pain, a prison spokesperson replied, "[w] ell, that's possible. When you touch a circuit you're going to feel a little something." [FN816] According to Virginia's Corrections Director, however, an investigation of Evans' execution was unnecessary because the chair did not malfunction. [FN817] "We know it didn't because there was no need to administer any additional surge of electricity." [FN818] " 'The machines involved operated properly.... Different people react differently.' " [FN819]

*672 Although Leuchter stated that he could not comment on the possibility that Evans' high blood pressure caused the bleeding, he emphasized that "[i]f they put something on his face that was too small for his physical features, that would be inhumane, medieval." [FN820] He explained that Virginia's Department of Corrections had communicated with him about five or six years prior to Evans' execution requesting a price estimate for replacing the helmet and electrodes used for the electric chair. [FN821] The State's attorneys dismissed Leuchter's negative comments claiming that he made these comments only because he was disgruntled that he did not receive the contract. [FN822] They contended that his failure to obtain the contract also explained why Leuchter had testified as an expert against the State (claiming that the State's electric chair could malfunction) in the appeal of Richard Boggs, [FN823] whom the State had executed three months earlier. [FN824]

5. Derick Lynn Peterson (Virginia, August 22, 1991)

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Peterson's death occurred after thirteen minutes and two separate jolts of electricity. [FN825] After the first series of jolts, Peterson's heart continued to beat. [FN826] One commentator gave an in depth account of the incident: At 11:01 p.m., an officer behind a one-way mirror starts the 1,725-volt current. After 10 seconds, it drops to 240 volts and runs for 110 more seconds. Peterson's hands and feet clench; his head jerks. His feet relax; he moans softly.... Dr. David Barnes, a Corrections Department doctor, checks Peterson's carotid arteries for a pulse. He rests his stethoscope against Peterson's bony chest. The doctor turns to the warden: "He hasn't expired." *673 Four minutes later, Dr. Barnes pokes the breast bone, then the left chest with the stethoscope. "This man has not expired." Peterson has lived for 7 1/2 minutes. The witnesses gasp. The executioner sends a second surge to the chair. Peterson wheezes. [FN827]

Peterson finally died. [FN828] The Director of Virginia's Department of Corrections explained: "We're dealing with brand new equipment. I think you have to make adjustments as you use the equipment." [FN829] He added that in future executions a second jolt would immediately follow the first. [FN830] Jail officials had "planned all along to do a second cycle if they felt it was necessary." [FN831] Jay A. Wiechert, owner of the Arkansas company that designed the wiring for Virginia's electric chair, stated that two doses need not be the standard practice. [FN832] " 'Many years ago, [two doses] was not uncommon at all.... With modern equipment, that would be uncommon.' " [FN833] After Virginia's announcement of its new "two-jolt policy," however, prison officials installed new electrical equipment on the chair and changed the dose of current. [FN834] According to Virginia's Deputy Director of the Department of Corrections, Edward C. Morris, "[t]he old chair used a much higher voltage. This [new] system is less likely to cause some of the burning of the body that happened in the old high-voltage system." [FN835] As noted earlier, however, the risk of botches in Virginia is also high under the new system. [FN836]

***674 6. Roger Keith Coleman (Virginia, May 20, 1992)**

During the electrocution of Roger Coleman, state executioners applied two 1,700-volt jolts of electricity with seven amps of energy. [FN837] According to Mike Hazlewood, a member of the Virginia legislature and a witness to the Coleman execution, "[a]s the switch was thrown, his body took an immediate jolt backwards. One thing I did notice was some smoke that started to come from his leg. This was ... when the current was running through his system." [FN838] When asked whether what he witnessed was some form of cruel and unusual punishment, Hazlewood said he thought that it was. [FN839] "[W]hat I witnessed ... was not instantaneous. It was a good seven minutes before a physician even examined Mr. Coleman to determine whether or not he was still alive." [FN840]

C. The Impact of Botches on the Courts

Electric chair botches, in some cases, have successfully halted executions or influenced legislatures. [FN841] For example, the controversy surrounding Tafero's execution created a temporary stay of all executions in Florida, in addition to a legislative examination of the chair and an alteration of its structure before the chair's safety was recertified. [FN842] The Angolite's article on electrocution helped persuade the Louisiana legislature to change its method of execution to lethal injection. [FN843] The botches in Virginia are mobilizing *675 some members of the State's legislature to introduce a lethal injection bill. [FN844]

At the same time, these efforts appear to be infrequent and short-lived. Florida reinstituted its use of electrocution as soon as some "experiments" identified the alleged cause of the botches. [FN845] Virginia's legislators have discouraged efforts to pass a lethal injection bill. [FN846]

The United States Supreme Court, however, may consider at some point the modern evidence on electrocution. Although the Court recently refused to stay Virginia's execution of Syvasky Poyner [FN847] in order to consider his class action lawsuit arguing that electrocution is cruel and unusual, [FN848] three Justices invited litigation on this issue noting that Kemmler is no longer dispositive. [FN849] Furthermore, it appears that a recent move by Loudoun County, Virginia prosecutors not to seek the death penalty against Curtis White may have been at least

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partially motivated by one attorney's unusual, pretrial effort to have the court review evidence on the effects of electrocution. [FN850] As one article noted, this change foiled *676 the attorney's attempt to challenge Virginia's sole method of execution. [FN851]

VI. IS ELECTROCUTION "FAR WORSE" THAN HANGING OR SHOOTING?

Historically, executions in this country were held in public. [FN852] They did not become completely private until 1937, when the last legal hanging took place in Missouri. [FN853] This evolution from public to private nonetheless evidenced some recognition that common execution methods were repugnant even if they did not resemble methods used in the past. [FN854]

Indeed, electrocution has never been public. [FN855] Witnesses of electrocutions typically include only a handful of reporters, attorneys, and prison officials and have provided documentation of the events relatively recently. [FN856] When the New York Times began its description *677 of Kemmler's execution with the headline, Far Worse Than Hanging, [FN857] it based its conclusion on accounts provided by twenty-five official witnesses, [FN858] in contrast to the throngs that attended public hangings. [FN859] Electrocution's century-long shield of privacy has prevented the kind of scrutiny that accompanied hanging. It has also helped derail any future investigation of the New York Times' conclusion.

Today, executions are sterile, [FN860] invisible [FN861] events. Only thirteen states authorize members of the press to witness an execution. [FN862] States rarely allow photography and typically, only when the prisoner achieves celebrity status does the press request to be a witness. [FN863] The drawbacks of such invisibility [FN864] are among the reasons recent commentators have argued on behalf of televised executions. [FN865]

*678 This Part describes briefly the history of hanging and shooting, and efforts to find a more humane method of execution to replace them. The Kemmler cases did not attack the cruelty of shooting as they did hanging, most likely because the Supreme Court had stated earlier in dictum that shooting was a constitutional method of execution. [FN866] Yet, the New York Commission never recommended shooting as an alternative to hanging. [FN867] Furthermore, by recommending electrocution they made clear that they thought it was the more humane method of inflicting death. [FN868] The following Section questions whether the Kemmler courts' conclusions were justified.

A. Hanging

Three states permit execution by hanging: New Hampshire, [FN869] Montana, [FN870] and Washington. [FN871] All three also allow lethal injection. In New Hampshire, injection is used unless the Commissioner *679 of Corrections finds "it to be impractical," in which case hanging is the alternative. [FN872] Montana and Washington both allow the defendant to choose either hanging or injection. [FN873] Only recently has any state been confronted with the issue of the constitutionality of hanging in light of the Ninth Circuit's call for an evidentiary hearing on this issue. [FN874]

1. Historical Overview

Hanging as a means of execution has been used since antiquity. [FN875] The Royal Commission on Capital Punishment suggested that hanging was created as a conspicuous symbol of indignity in order to deter others from committing crime, rather than as a more effective means of execution compared to earlier techniques. [FN876] Thus, the public considered early hangings, which caused a slow and agonizing death, to be particularly degrading compared with the more instantaneous and "honourable" forms of execution, such as beheading and the firing squad. [FN877]

The modern "science" of hanging, however, developed in nineteenth-century Great Britain where master hangmen discovered that the most successful hangings resulted from the "long drop," a fall sufficiently long to

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break an offender's neck, induce immediate unconsciousness, and promote a quick death, [FN878] which in some cases could still take up to twenty minutes. [FN879] Although hanging has been considered a controversial method of execution in the United States, [FN880] British experts have held a contrary view. The Royal Commission concluded in 1950 that hanging was the most acceptable method of execution in terms of its "humanity," "certainty," *680 and "decency." [FN881] In 1969, however, the United Kingdom abolished the death penalty entirely. [FN882]

Whether the Royal Commission's conclusion would remain the same today is open to question. As this Section emphasizes, however, methods of execution have not changed substantially in the last two decades. In support of the Royal Commission's recommendation, evidence suggests that a correctly-performed, long-drop hanging can induce unconsciousness, and therefore instantaneously eliminate the prisoner's ability to feel pain. [FN883] For example, some individuals who suffered partial hanging or who attempted suicide by hanging have stated that they did not experience physical pain before they lost consciousness. [FN884] Yet commentators have questioned these accounts. [FN885] Moreover, whether immediate unconsciousness occurs if the neck is not broken is uncertain. [FN886]

More certain is the evidence of suffering or gruesomeness that occurred during early incompetent hangings, a factor that influenced the Kemmler Court. [FN887] In 1967, Negley K. Teeters and Jack H. Hedblom estimated that the United States had executed 16,000 individuals by hanging, [FN888] yet many hangings were botched, particularly before the use of the long drop became standard. [FN889] If the drop was too short, hanging often resulted in a long and painful death by strangulation, [FN890] or if the drop was too long, in decapitation. [FN891]

*681 In order to avoid such inefficiency, a number of different hanging devices have been developed to ensure that the neck breaks, including a machine invented during the last century that raised the inmate in the air by dropping a heavy weight attached to the other end of the rope. [FN892] This method was not always successful, however, as one early case of strangulation in New York revealed. [FN893] Connecticut used a more reliable method until the 1930's, but the State ultimately deemed this method illegal because it required the inmate to commit suicide. [FN894] The inmate would step on a metal trap so that his weight released a heavier weight that hoisted him six feet above floor level, instantly fracturing his neck vertebrae. [FN895] Fred Leuchter designed a gallows that relies on a hanging formula developed by British military executioners. [FN896] The gallows drops an inmate with the force of 1,600 foot-pounds, which is apparently adequate to sever the inmate's spinal cord and "painlessly" break his neck. [FN897]

2. Indignities

Hanging entails additional indignities aside from the pain and torture that accompany strangulation and gruesome decapitations. [FN898] Clinton T. Duffy, the former Warden of San Quentin Prison, provided a description of hanging based on his attendance at sixty executions: Hanging, whether the prisoner is dropped through a trap, after climbing a traditional 13 steps, or whether he is jerked from the floor after having been strapped, black-capped and noosed, is a very gruesome method of execution.... The day before an execution the prisoner goes through a harrowing experience of being weighed, measured for length of drop to assure breaking of the neck, the size of the neck, body measurements, *682 et cetera. When the trap springs he dangles at the end of the rope. There are times when the neck has not been broken and the prisoner strangles to death. His eyes pop almost out of his head, his tongue swells and protrudes from his mouth, his neck may be broken, and the rope many times takes large portions of skin and flesh from the side of the face that the noose is on. He urinates, he defecates, and droppings fall to the floor while witnesses look on, and at almost all executions one or more faint or have to be helped out of the witness room. The prisoner remains dangling from the end of the rope for from 8 to 14 minutes before the doctor, who has climbed up a small ladder and listens to his heart beat with a stethoscope, pronounces him dead. A prison guard stands at the feet of the hanged person and holds the body steady, because during the first few moments there is usually considerable struggling in an effort to breathe. The legal witnesses are dismissed after having signed the usual witness forms. However, the body of the condemned is

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left hanging below the gallows for an additional 10 to 20 minutes. This is to assure those in charge that ample time has elapsed before cutting the rope in order to make certain of death. [FN899]

Grotesque hanging accidents continued into the 1960's, even with skilled hangmen performing the executions. In the early 1960's at the Washington State Prison in Walla Walla, for example, an inmate's head was nearly ripped off entirely, spraying blood on the witnesses in the front row. [FN900] To preclude further incidents, prison workers hung a large sheet in front of the gallows platform. [FN901]

Problems ensuring a successful hanging continue to occur. As one commentator stated, "[h]anging is a difficult business. One slip can cause strangulation or decapitation." [FN902] Furthermore, qualified hangmen are difficult to find, as the State of Washington recently *683 discovered when it undertook a thorough search for one. [FN903] In addition, the competency of the procedure can determine the degree of suffering involved. [FN904]

The cruelty and indignity associated with hanging prompted legislation against its use. [FN905] Although before Kemmler, every state authorized hanging, [FN906] by 1973 only seven states still permitted it, [FN907] and today only three do. [FN908] Moreover, no Supreme Court decision specifically upholds the constitutionality of its use. [FN909]

3. The Hanging of Westley Allan Dodd

In general, no definitive evidence answers whether a properly performed hanging results in instantaneous death. Because hangings are now relatively infrequent, to continue evaluating them is difficult. Apparently, however, a properly performed hanging is "no worse" than a properly performed electrocution and perhaps may even be more humane.

The hanging of child-killer Westley Allan Dodd on January 5, 1993, in Washington State, was this country's first legal hanging since 1965. [FN910] Relying on a U.S. Army execution manual written in the 1880's, state officials fitted Dodd with a black hood over his head and a noose around his neck before he fell seven feet through a trap door in front of sixteen witnesses. [FN911] The witnesses sat about eight feet away behind a glass window, and at the base of a splitlevel *684 execution chamber. [FN912] After Dodd's limp body hung for less than two minutes, the blinds closed. [FN913] Three minutes later, doctors pronounced Dodd dead. [FN914]

Even though the State "was unsure about mechanics and procedures," [FN915] by all accounts the hanging appeared to be relatively swift and humane. [FN916] As Dodd's attorney explained, "I went into the review room expecting to see something very revolting, very ghastly [but] I came away with the view that, 'Hey, if you are going to be executed, hanging is the way to go.'" [FN917] Moreover, none of the witnesses reported any signs that Dodd suffered or was in pain. [FN918]

The medical examiner who performed Dodd's autopsy also said Dodd "suffered little pain." [FN919] However, the execution did not cause "the classic hangman's fracture," as the examiner had expected after he had consulted with state officials to ensure that the hanging would go as planned. [FN920] Rather, Dodd apparently died of both neck damage and strangulation. [FN921] Some attorneys thus claimed that Dodd's execution demonstrated how easily hangings could be botched although in this case Dodd died quickly, even without a broken neck. [FN922]

Even if courts could declare that execution by hanging is not cruel and unusual, it is difficult to argue that, in practice, a botched hanging is not foreseeable. The probability of a botched hanging may be quite high because the infrequency with which hangings occur precludes the opportunity to perfect the task, and few experts are available for consultation. For example, the medical *685 examiner responsible for Dodd's autopsy conceded that it was the first autopsy he had performed on a hanged convict and that "there is very little medical literature on the subject." [FN923] As one attorney commented, "[m]ost hangings have resulted in fairly quick deaths, ... [b]ut many of them don't, and there is no way to predict or control that." [FN924] In this sense, hanging may

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share with electrocution a comparable lack of predictability, but no evidence exists to show that the method is relatively more susceptible to bungles.

These issues are relevant to arguments made to the Ninth Circuit Court of Appeals, which has called for an evidentiary hearing to determine whether hanging is cruel and unusual punishment under the Eighth Amendment. [FN925] The petitioner, Charles Campbell, is questioning in particular the method used in Washington State.

Campbell's challenge has obstacles. First, the State of Washington concedes that it has no records of any kind concerning judicial hangings occurring prior to January 1993, [FN926] and provided records pertaining only to the execution of Westley Allen Dodd. [FN927] Given that the district court held that any evidence Campbell offered concerning past judicial hangings is irrelevant unless it meets certain, virtually unobtainable criteria, [FN928] Campbell is left with evidence only on the Dodd execution, which proceeded smoothly.

Excluded from the evidentiary hearing is a wealth of information Campbell provided on the following issues: (1) evidence on the lack of predictability of the exact causal mechanism leading to death and of the length of time that any one individual may need to die; [FN929] (2) evidence that hanging practically never results in the classic "hangman's fracture," a thorough severance or crushing of *686 the spinal cord; [FN930] (3) evidence that even if the hangman's fracture does occur, a frequent result is paralysis, not unconsciousness; the conscious person would live for another minute or two but simply be unable to breathe; [FN931] (4) evidence that because the hanged person is hooded while being executed, a witness would not be able to detect facial movements or gestures of pain that a paralyzed, but conscious, person may make; [FN932] (5) evidence on the inability to prevent occurrences of decapitation; [FN933] (6) historical evidence on botched hangings in the State of Washington [FN934] as well as a compilation of articles concerning 170 botched judicial hangings performed in the United States between 1622 and 1993. [FN935]

The Ninth Circuit's decision bears on constitutional arguments concerning electrocution. If the Ninth Circuit finds hanging to be unconstitutional, such a finding would support the argument that evidence on electrocution should also be evaluated.

*687 B. Shooting

Two states permit execution by shooting: [FN936] Idaho [FN937] and Utah. [FN938] Both states also allow lethal injection. [FN939] In Idaho, shooting is an alternative only if lethal injection is "impractical." In Utah, the defendant is free to choose between methods. In 1913, Nevada conducted its only execution by firing squad. [FN940]

Today, Utah has produced the most documentation on shooting as an execution method. The State conducts executions at the state prison at Point-of-the-Mountain, near Salt Lake City. [FN941] Firing squads consist of five volunteer marksmen, four of whom receive rifles with live rounds while a fifth rifle contains a blank to *688 prevent any single member from feeling personal guilt for the killing. [FN942] The marksmen are hidden from both the witnesses and the inmate, who is usually seated and strapped to a chair with a blindfold over his eyes. [FN943] Using a stethoscope, the prison's doctor finds the exact location of the inmate's heart and attaches a bull's-eye over it. [FN944] The doctor also has the duty of determining if the inmate is dead after the shooting. [FN945] Upon a signal from the Warden, four marksmen shoot at the target on the inmate's heart. [FN946]

Whether a correctly-performed shooting is physically painful is not clear. The Royal Commission on Capital Punishment did not consider the firing squad to be a feasible method of execution, concluding in one sentence that "it needs a multiplicity of executioners and it does not possess even the first requisite of an efficient method, the certainty of causing immediate death." [FN947] The Royal Commission, however, never presented evidence to support this conclusion. Indeed, in those states that provide a choice between hanging and shooting, inmates have selected shooting over hanging, a selection inconsistent with the Royal Commission's recommendation. [FN948]

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Some evidence demonstrates that a competently performed shooting may cause nearly instant death. In one rare case of "human experimentation" in 1938, a forty-two year old inmate condemned to death for murder in Utah permitted doctors to conduct an electrocardiograph (ECG) tracing during the execution. [FN949] The ECG wires were attached to the inmate's wrists and a small target was placed over his heart, which was beating at nearly three times the normal rate. [FN950] When the bullets entered the inmate's heart, it went into a four-second spasm, followed by a fifteen-second interval of uniform electrical activity that included a second *689 spasm. [FN951] Complete "electrical 'silence' " followed. [FN952] Gary Gilmore, who "quivered" after four bullets entered his heart, was pronounced dead two minutes later. [FN953]

An incompetently-performed shooting, however, may well cause acute pain. [FN954] Vengeance can be a motivation for incompetence when ordinary citizens are involved in the execution process. [FN955] In a 1951 Utah execution, for example, all four executioners shot bullets into the wrong side of the inmate's chest, apparently intentionally, and the individual bled to death. [FN956] In another case, the executioners shot the inmate in the shoulder. [FN957] After screaming in pain for twenty minutes, one of the gunmen finally shot the inmate in the head after searching for more ammunition. [FN958]

The possibility for vengeance and its accompanying cruelty hinder the acceptability of shooting as a means of execution. Shooting also mutilates the body. [FN959] Whether or not a competently performed shooting is any crueler than any other currently-used method of execution, however, is unclear. Experimentation suggests that death may occur quickly. In turn, mutilation may not be any greater than the burns and bleeding that accompany electrocution. Furthermore, vengeance is a potential factor in any execution method; it is simply more obvious in a firing squad, where the chance that a group of people unintentionally could err simultaneously is extremely small. Corrections officials probably would not tolerate such conspiracies today, and a disciplinary board could be available to deter such actions. In sum, no evidence suggests that a properly performed shooting is crueler than electrocution or that botched shootings are relatively more foreseeable.

*690 CONCLUSION

Recent polls show the great majority (eighty percent) of Americans endorse capital punishment. [FN960] Yet, with 2,400 people on death rows nationwide and twenty-three states preparing to join the fifteen that have executed criminals since Gregg, the public is confronting capital punishment's "grisly and brutal aspects." [FN961]

This Article's Eighth Amendment analysis of electrocution reaches several conclusions. First, considerable scientific and eyewitness evidence suggests that electrocution can amount to cruel and unusual punishment even when states properly administer it. Given the possibility that a botched electrocution can occur, continuing the practice of electrocution constitutes cruel and unusual punishment even if a properly planned electrocution would not. [FN962] Second, instead of evaluating this evidence or investigating the procedures used, many courts have erroneously interpreted and expanded both Kemmler and Francis, typically in one brief sentence, as constitutional justifications for electrocution and other execution methods.

Third, although electrocution was originally introduced as a more humane form of punishment compared to those preceding it--hanging and shooting--substantial scientific and eyewitness evidence indicates that its consequences are no less cruel than those other methods under Eighth Amendment standards, and they may be even crueler.

Fourth, over the century, a small number of individuals who have engaged in the aggressive marketing of, and financial investment in, execution techniques, most particularly electrocution, have swayed state legislatures and departments of corrections. Key figures such as Harold Brown, near the turn of the century, and Fred Leuchter, during the past decade, have succeeded in monopolizing the manufacturing and promoting of electrocution equipment because others deem such business undesirable. By depending *691 on such monopolies, states have failed to investigate adequately the execution methods they have purchased or the qualifications of the persons

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who created them. Similarly, state authorities have contributed to botched executions which, in many cases, can be linked to a variety of avoidable circumstances including ignorance about machinery and engineering, inexperienced advice, limited funding for proper equipment, and negligence with respect to technical problems repeatedly experienced, but not corrected, by departments of corrections across the country.

Lastly, this Article recommends constitutional scrutiny of electrocution based on Eighth Amendment standards. The Supreme Court has indicated that it is ready to engage in such an analysis. [FN963] Until the Supreme Court engages in such scrutiny, lower courts should halt indefinitely executions involving electrocution.

A comparison of the electrocution method with its predecessors, hanging and shooting, does not solve the issue of whether electrocution is unconstitutionally cruel. At some point, researchers may even conclude that electrocution is a more humane method than hanging and shooting. However, such relative humaneness should not ensure the constitutionality of electrocution. Nor should courts hold lethal injection to be constitutional simply because it is the method that appears most humane and that which the public favors. [FN964] Courts must evaluate each method individually by established *692 Eighth Amendment standards, not by using straw standards and comparisons.

States' efforts to bypass constitutional and public scrutiny of execution methods are not new. Such maneuvering has existed over the course of the century beginning with New York State's first use of electrocution in 1890 as a method of perpetuating the death penalty through allegedly humanitarian means. In an effort to placate political demands for capital punishment, states and the judiciary have avoided the Eighth Amendment scrutiny necessary to determine if methods are indeed cruel and unusual, or if a less cruel alternative is pragmatically available.

The blame for cruel executions, then, lies not with those who create the methods, like Harold Brown or Fred Leuchter. Rather, the blame rests with the State and the judiciary that enforces them. Sir Thomas More, who forgave his executioner before he was beheaded, recognized this distinction. The headsman was not the source of moral error, the State was. [FN965]

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FN1. STEPHEN TROMBLEY, THE EXECUTION PROTOCOL: INSIDE AMERICA'S CAPITAL PUNISHMENT INDUSTRY 44-46 (1992).

FN2. Id. at 44 (characterizing Tafero's execution as "probably the most gruesome in U.S. history"); Cynthia Barnett, Tafero Meets Grisly Fate in Chair, GAINESVILLE SUN, May 5, 1990, at 1A, 9A (quoting an Associated Press reporter who witnessed Tafero's execution, stating that the incident "was, in a word, gruesome.... I've never seen anything like this....").

FN3. Cynthia Barnett, A Sterile Scene Turns Grotesque, GAINESVILLE SUN, May 5, 1990, at 1A; Barnett, *supra* note 2, at 1A.

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FN4. Barnett, *supra* note 2, at 1A.

FN5. Ron Word, Florida's Electric Chair Focus of Legal Debate, ST. PAUL PIONEER PRESS DISPATCH, June 24, 1990, at 5A. Accounts varied concerning the height of the flames erupting from Tafero's head. For example, Gary McLain, the deputy inspector general of the Department of Corrections, stated that he saw twelve-inch flames, whereas the prison superintendent, Tom Barton, stated that the flames were about two and one-half to three and one-half inches high. TROMBLEY, *supra* note 1, at 47. Barton's estimate of the height of the flames was confirmed by others. Later he insisted that an investigation of Tafero's execution was not necessary. *Id.* at 46.

FN6. Barnett, *supra* note 2, at 1A.

FN7. Dawn M. Weyrich, Gruesome Blunders; Botched Execution Spurs New Death Row Challenge, WASH. TIMES, June 7, 1990, at A1.

FN8. Barnett, *supra* note 2, at 1A.

FN9. Weyrich, *supra* note 7, at A1.

FN10. See Barnett, *supra* note 2, at 9A. Cynthia Barnett, whose views were representative of those held by others, commented that "[t]he executioner's face was hidden with a black hood, but you could see his eyes through a slot in his hiding place. They were large and round and shocked, maybe even as shocked as mine." *Id.*

FN11. See TROMBLEY, *supra* note 1, at 44; see also *supra* notes 2-3, 7.

FN12. See Barnett, *supra* note 2, at 1A. The executioner was required to change from automatic to manual control of the current after the first jolt was insufficient. See *id.* at 9A.

FN13. See TROMBLEY, *supra* note 1, at 48-50; see also *infra* notes 14-19 and accompanying text (describing the opinions of various experts).

FN14. See *Buenoano v. Dugger*, No. 90-473-CIV-ORL-19, 1990 WL 119637, at *32 (M.D.Fla. June 22, 1990) (citing the affidavit and testimony of Fred Leuchter, a "consulting engineer who designs and constructs electric chairs"), vacated sub nom. *Buenoano v. Singletary*, 963 F.2d 1433 (11th Cir.1992); TROMBLEY, *supra* note 1, at 51-52 (describing an interview with Fred Leuchter on Tafero's execution); State Used Army Boot to Fix Electric Chair, Affidavit Says, SUN SENTINEL (Ft. Lauderdale, Fla.), June 16, 1990, at 17A (referring to Fred Leuchter's affidavit); see also *infra* notes 658-62 and accompanying text.

FN15. *Buenoano*, 1990 WL 119637, at *32.

FN16. See TROMBLEY, *supra* note 1, at 60 (discussing the views of Dr. Robert Kirschner, the deputy chief medical examiner of Cook County in Illinois and a specialist in torture and human rights abuses, who reviewed the available evidence in Tafero's case); Weyrich, *supra* note 7, at A1 (describing the views of experts).

FN17. Weyrich, *supra* note 7, at A1; see also TROMBLEY, *supra* note 1, at 60 (quoting Dr. Kirschner's view that "the failure to administer the requisite voltage combined with the other physiological reactions noted by observers of the execution raises the substantial possibility that Mr. Tafero experienced conscious pain and suffering during the execution").

FN18. See Larry Keller, Autopsy Fails to End Execution Dispute, SUN SENTINEL (Ft. Lauderdale, Fla.), May 8, 1990, at 17A (referring to the explanation provided by the medical examiner's spokesperson).

FN19. See State Disputes "Prime Time" Report on Electrocution, SUN SENTINEL (Ft. Lauderdale, Fla.), May 13,

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1990, at 11A.

FN20. It appears that the term "botch" as it applies to executions was first used to describe Kemmler's mishap. See Far Worse Than Hanging, N.Y. TIMES, Aug. 7, 1890, at 1-2. The term has been frequently used since that time to characterize defective executions. See, e.g., Elizabeth Fernandez, All Forms of Execution Produce Horror Stories, S.F. EXAMINER, Apr. 22, 1992, at A14 (listing the most recent "botched executions"). According to Herb Haines, the term "botched execution" is too narrow because it excludes other aspects of the capital punishment process that also go awry. Herb Haines, Flawed Executions, the Anti-Death Penalty Movement, and the Politics of Capital Punishment, 39 SOC. PROBS. 125, 125 (1992). He prefers the broader term "flawed executions," defined as "executions in which public sensibilities are offended by a breakdown in the 'normal' routine of convicting killers and putting them to death." Id. Because this Article examines the constitutionality of electrocution rather than its more general effect on "public sensibilities," it relies on the narrower term. Thus, this Article focuses on those executions that appear to be "technically botched" in such a way as to cause the prisoner unnecessary pain, physical violence, or mutilation.

FN21. See *infra* notes 307-22 and accompanying text.

FN22. 136 U.S. 436 (1890).

FN23. See *id.* at 447.

FN24. The Eighth Amendment provides that "[e]xcessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted." U.S. CONST. amend. VIII.

FN25. Kemmler, 136 U.S. at 443 (quoting *People ex rel. Kemmler v. Durston*, 7 N.Y.S. 813, 816 (1889)).

FN26. See John G. Leyden, Death in the Hot Seat: A Century of Executions, WASH. POST, Aug. 5, 1990, at D5 (noting that over 4,100 persons have been executed by electrocution in this century).

FN27. See BUREAU OF JUSTICE STATISTICS, DEP'T OF JUSTICE, SOURCEBOOK OF CRIMINAL JUSTICE STATISTICS, 1990, at 682, 686 (1991).

FN28. See *Robinson v. California*, 370 U.S. 660 (1962); *infra* notes 430-32 and accompanying text.

FN29. See *infra* notes 455-66 and accompanying text. These courts also have used inappropriately as precedent, *Louisiana ex rel. Francis v. Resweber*, 329 U.S. 459 (1947), another botched electrocution case. Francis, however, concerned the constitutionality of repeated or "abortive" attempts at electrocution, not the method itself. Id. at 462-66; see also Arthur J. Goldberg & Alan M. Dershowitz, Declaring the Death Penalty Unconstitutional, 83 HARV.L.REV. 1773, 1784 n. 51 (1970) (noting that "[t]he precedential force of both Kemmler and Francis is limited by the fact that neither one specifically applied the cruel and unusual punishment clause").

FN30. See *infra* part IV.B-C.

FN31. Kemmler, 136 U.S. at 447. For a brief account of electrocution botches over the course of the century, see HELEN PREJEAN, DEAD MAN WALKING: AN EYEWITNESS ACCOUNT OF THE DEATH PENALTY IN THE UNITED STATES 18-20 (1993).

FN32. This Article does not embark on a quest for the most humane method of execution. Nor does it concern the wisdom of having the death penalty. Rather, this Article attempts to keep opinions on the morality of capital punishment separate from views on how such punishments should be implemented, recognizing that each issue can be debated on its own merits. See, e.g., Ernest W. Lefever, Is It Just to Impose the Death Penalty?, WASH. TIMES, Apr. 28, 1992, at F2 (noting that the critics of Robert Alton Harris' execution should have kept these two issues separate). But see American Civil Liberties Union, The Death Penalty (Briefing Paper No. 8) (1991) (contending that, by

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advocating one type of execution method over another, commentators impede the opposition of the death penalty by any method).

FN33. See *Poyner v. Murray*, 113 S.Ct. 2397 (1993). Justices Souter, Blackmun, and Stevens commented on the denial of Syvasky Poyner's petition for writ of certiorari. See *id.* at 2398-99; see also Application for Stay of Execution, *Poyner v. Murray*, 113 S.Ct. 1573 (1993) [hereinafter *Poyner Stay*].

FN34. See *Poyner*, 113 S.Ct. at 2399 ("The Court has not spoken squarely on the underlying issue since *In re Kemmler*, 136 U.S. 436 (1890), and the holding of that case does not constitute a dispositive response to litigation of the issue in light of modern knowledge about [electrocution].") (citations omitted).

FN35. See *Campbell v. Blodgett*, 992 F.2d 984 (9th Cir.) (en banc), application to vacate remand dismissed, 113 S.Ct.1965 (1993) (per curiam).

FN36. See *infra* notes 80-87 and accompanying text.

FN37. *People v. Kemmler* (N.Y.Ct. Oyer and Terminer Erie County 1889) ("Kemmler I"). For a brief account of the Kemmler I trial, as contained in certain court documents from indictment to sentencing, see Transcript of Proceedings at 1035-42 (Ex. A), *In re Kemmler*, 7 N.Y.S. 145 (1889) [hereinafter *Kemmler II Transcript*].

FN38. *In re Kemmler*, 7 N.Y.S. 145 (Cayuga County Ct.1889) ("Kemmler II"); *People ex rel. Kemmler v. Durston*, 7 N.Y.S. 813 (Sup.Ct.1889) ("Kemmler III"); *People ex rel. Kemmler v. Durston*, 24 N.E. 6 (N.Y.1890) ("Kemmler IV").

FN39. *In re Kemmler*, 136 U.S. 436 (1890).

FN40. See Anthony F. Granucci, "Nor Cruel and Unusual Punishments Inflicted": The Original Meaning, 57 CAL.L.REV. 839, 844 (1969).

FN41. See Exodus 21:24-25 (The Jerusalem Bible). Others have noted that the oldest known prescription relating to the death penalty is the Code of Hammurabi, the sixth king of the first dynasty of Babylon. See EDDIE L. SMITH, *THE CHAIR* 16 (1965). Hammurabi's Code is estimated to be about 4,000 years old and developed about 1,000 years before the time of Moses. The Code's foundations include both the prevention of crime and retribution for crimes committed. See *id.*

FN42. See Granucci, *supra* note 40, at 844. The three methods of execution found in the Bible are stoning, burning, and hanging. Stoning was the primary method of execution in biblical times. Burning was used either as a separate method or as a way to aggravate stoning. Hanging was used both as an execution method as well as a means of deterrence to others after an execution, since the body hung until nightfall. See Edna Erez, *Thou Shalt Not Execute: Hebrew Law Perspective on Capital Punishment*, 19 CRIMINOLOGY 25, 29 (1981).

FN43. See Granucci, *supra* note 40, at 844-47.

FN44. See *id.* at 845.

FN45. See *id.* at 844-47.

FN46. See *Ingraham v. Wright*, 430 U.S. 651, 664 (1977); see also *Harmelin v. Michigan*, 111 S.Ct. 2680, 2691-93 (1991).

FN47. See *Ingraham*, 430 U.S. at 664; see also U.S. CONST. amend. VIII (including the concept of a prohibition on cruel and unusual punishments).

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FN48. See *Ingraham*, 430 U.S. at 664-65; *Weems v. United States*, 217 U.S. 349, 371-73 (1910). As Granucci notes, "[i]t is indeed a paradox that the American colonists omitted a prohibition on excessive punishments and adopted instead the prohibition of cruel methods of punishment, which had never existed in English law." Granucci, *supra* note 40, at 847.

FN49. See *Ingraham*, 430 U.S. at 666.

FN50. *Furman v. Georgia*, 408 U.S. 238, 263 (1972) (Brennan, J., concurring).

FN51. See *id.* A thorough discussion of the history of the Cruel and Unusual Punishments Clause with respect to the intent of the Framers may be found in RAOUL BERGER, *DEATH PENALTIES: THE SUPREME COURT'S OBSTACLE COURSE* 29-58 (1982); see also HUGO A. BEDAU, *DEATH IS DIFFERENT: STUDIES IN THE MORALITY, LAW, AND POLITICS OF CAPITAL PUNISHMENT* 92-128 (1987).

FN52. Such ambiguity permits some flexibility in interpretation today. See *Furman*, 408 U.S. at 263-65 (Brennan, J., concurring).

FN53. As the court in *Kemmler II* noted, the Constitution of the United States and that of New York State both prohibited cruel and unusual punishment "in language almost identical." *In re Kemmler*, 7 N.Y.S. 145, 148 (1889). The relevant portion of the New York Constitution reads as follows: "Excessive bail shall not be required, nor excessive fines imposed, nor shall cruel and unusual punishments be inflicted, nor shall witnesses be unreasonably detained." N.Y. CONST. art. I, § 5.

FN54. This section relies heavily on Philip Mackey's extensive study of the history of capital punishment in New York State. See PHILIP E. MACKEY, *HANGING IN THE BALANCE: THE ANTI-CAPITAL PUNISHMENT MOVEMENT IN NEW YORK STATE, 1776-1861* (1982).

FN55. See *id.* at 1-3. According to execution historian Watt Espy, the first execution that he has been able to document occurred in 1608--the shooting of George Kendall, a Spanish spy, in the Virginia colony. Francis X. Clines, *A Dismayed Historian of the Gallows*, N.Y. TIMES, Nov. 18, 1992, at A16. So far, Espy has reported over 18,000 documented executions in the United States. *Id.* He predicts that the final total will exceed 22,000 when his work on documenting executions is completed. Russell F. Canan, *Burning at the Wire: The Execution of John Evans, in FACING THE DEATH PENALTY* 60, 67 (Michael Radelet ed., 1989).

FN56. See MACKEY, *supra* note 54, at 1-3.

FN57. See *id.* at 21-26.

FN58. See *id.* at 28-30, 33-34.

FN59. See *id.* at 34; LAWRENCE M. FRIEDMAN, *CRIME AND PUNISHMENT IN AMERICAN HISTORY* 41-42 (1993); see also LAWRENCE M. FRIEDMAN, *A HISTORY OF AMERICAN LAW* 70 (2d ed. 1985) (noting that England had relatively more capital crimes than the United States).

FN60. See MACKEY, *supra* note 54, at 5-35. Although Mackey does not discuss whether New York's posture was affected by its growing population and economy during the first half of the eighteenth century, the "commercialization" of New York society did have a significant impact on legal practice in New York's civil courts. See Deborah A. Rosen, *Courts and Commerce in Colonial New York*, 36 AM.J.L.HIST. 139, 162 (1992). See generally THOMAS J. DAVIS, *A RUMOR OF REVOLT* (1985) (emphasizing the impact of economic depression and the war on bigotry against familiar targets, such as blacks and Catholics, in an account of the "Great Negro Plot" in which 34 persons were executed in New York in 1741).

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FN61. See DAVIS, *supra* note 60, at 80-81.

FN62. See MACKEY, *supra* note 54, at 79-81.

FN63. For an account of early public hangings in Florida, see Ken Driggs, A Current of Electricity Sufficient in Intensity to Cause Immediate Death: A Pre-Furman History of Florida's Electric Chair, 22 STETSON L.REV. 1169, 1174-76 (1993).

FN64. See MACKEY, *supra* note 54, at 108; see also AUGUST MENCKEN, BY THE NECK at xv (1942) (explaining that in the more remote regions of the country, large crowds turned out to see public hangings); NEGLEY K. TEETERS & JACK H. HEDBLUM, HANG BY THE NECK 19 (1967) ("In retrospect we are likely to admit that the era of public hanging was far more dramatic, socially satisfying, even though bizarre and emotionally tense, than any other later period of the history of capital punishment in this country."). The attraction of public hangings in England has been described in detail. See generally GEOFFREY ABBOTT, LORDS OF THE SCAFFOLD 105-47 (1991); HORACE BLEACKLEY, THE HANGMEN OF ENGLAND at xv (1929), reprinted in STATE EXECUTIONS VIEWED HISTORICALLY AND SOCIOLOGICALLY (Patterson Smith Series in Criminology, Law Enforcement & Social Problems Publication No. 170, 1977); DAVID D. COOPER, THE LESSON OF THE SCAFFOLD (1974); Barry Faulk, The Public Execution: Urban Rhetoric and Victorian Crowds, in EXECUTIONS AND THE BRITISH EXPERIENCE FROM THE 17TH TO THE 20TH CENTURY 77, 77-91 (William B. Thesing ed., 1990); Steven Wilf, Imagining Justice: Aesthetics and Public Executions in Late Eighteenth Century England, 5 YALE J.L. & HUMAN. 51 (1993).

FN65. MACKEY, *supra* note 54, at 108.

FN66. *Id.* at 108-09.

FN67. *Id.* (citation omitted).

FN68. See *id.* at 109.

FN69. See *id.* at 115.

FN70. *Id.* at 116; see also Steven Blum, Public Executions: Understanding the "Cruel and Unusual Punishments" Clause, 19 HASTINGS CONST.L.Q. 413, 418 (1992) (noting that despite New York's attempt to halt public hangings, the statutes of several other states provided the sentencing courts with discretion to order public executions for certain crimes, such as rape).

FN71. MACKEY, *supra* note 54, at 117-18. This move coincided with the trend in other states. See generally LOUIS P. MASUR, RITES OF EXECUTION: CAPITAL PUNISHMENT AND THE TRANSFORMATION OF AMERICAN CULTURE, 1776-1865 (1989) (discussing the trend during the period toward elimination of public hangings).

FN72. See MACKEY, *supra* note 54, at 119.

FN73. See *id.* at 124-25.

FN74. See *id.* at 124-263.

FN75. See *id.* at 264-66.

FN76. See *id.*

FN77. See *id.* at 264-313.

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FN78. Between 1897 and 1917, 10 states abolished the death penalty. John F. Galliher et al., *Abolition and Reinstatement of Capital Punishment During the Progressive Era and Early 20th Century*, 83 J.CRIM.L. & CRIMINOLOGY 538, 541 (1992). Most of these states had very small populations of minority citizens, and passed their abolition laws during the economic boom that occurred prior to the United States entry into World War I. *Id.* at 542. The authors' analyses of these 10 states conclude that the humanitarian concerns of legislators advocating the abolition of capital punishment are associated with the changing economic climate in a society. See *id.* at 543. For economic reasons also, eight of the 10 states had reinstated the death penalty by the end of the 1930's. *Id.* at 575-76.

FN79. A more detailed account of particular hanging botches that encouraged the New York legislature to turn to electricity as an execution method can be found in Elbridge T. Gerry, *Capital Punishment by Electricity*, 149 N.AM.REV. 321, 322-24 (1889). According to Michel Foucault, the history of punishment is marked by the continual search for a more humane means of enforcing public censure. See MICHEL FOUCAULT, *DISCIPLINE AND PUNISH: THE BIRTH OF THE PRISON* 86 (Alan Sheridan trans., 1977). Another commentator contends, however, that what is considered "humane" is marked with limitations. He states that "humane treatment simply does not offend human sensibilities, and therefore cannot be graphic, spectacular, or terroristic." John W. Murphy, *Technology, Humanism and Death by Injection*, 11 PHIL. & SOC. ACTION 55, 56 (1985). The less passionate the method, the more humane it becomes because the society appears to be guided by the exercise of reason, and its members characterized as rational actors. See MICHEL FOUCAULT, *MADNESS AND CIVILIZATION: A HISTORY OF INSANITY IN THE AGE OF REASON* 78 (Richard Howard trans., 1965). Electrocution was considered less passionate than hanging because it appeared to be more a product of engineering, and less an agent of pure death.

FN80. *In re Kemmler*, 136 U.S. 436, 444 (1890).

FN81. This Commission was appointed according to 1886 N.Y.LAWS ch. 352.

FN82. *Kemmler III*, 7 N.Y.S. 813, 816 (Sup.Ct.1889).

FN83. 1886 N.Y.LAWS ch. 352, § 1. For a further description of the Commission's appointment, see HUGO A. BEDAU, *THE DEATH PENALTY IN AMERICA* 17-18 (2d ed. 1968); LARRY C. BERKSON, *THE CONCEPT OF CRUEL AND UNUSUAL PUNISHMENT* 23 (1975).

FN84. REPORT OF THE COMMISSION TO INVESTIGATE AND REPORT THE MOST HUMANE AND PRACTICAL METHOD OF CARRYING INTO EFFECT THE SENTENCE OF DEATH IN CAPITAL CASES (1888) [hereinafter COMMISSION REPORT].

FN85. Terry S. Reynolds & Theodore Bernstein, *Edison and "The Chair,"* 8 IEEE TECH. & SOC'Y MAG. 19, 19 (1989).

FN86. *Kemmler IV*, 24 N.E. 6, 8 (N.Y.1890). The due date for the Commission Report was extended according to 1887 N.Y.LAWS ch. 7. See COMMISSION REPORT, *supra* note 84, at 1.

FN87. The Commission's Report, which was in the form of a letter to the New York legislature, discussed the history of capital punishment and methods of execution. The Report began by examining a list of offenses that carried the punishment of death in the Bible and in Athens. See COMMISSION REPORT, *supra* note 84, at 4-5. The Report then discussed the evolution of death penalty law in England and the United States, *id.* at 6-13, and ended with a review of all 34 methods of capital punishment known at the time of the Report. These were: auto da fe (public burnings that took place during the Spanish Inquisition), *id.* at 14, beating with clubs, *id.*, beheading, *id.* at 14-19, blowing from a cannon, *id.* at 19, boiling, *id.* at 19-20, breaking on the wheel, *id.* at 20, burning, *id.* at 21-22, burying alive, *id.* at 22, crucifixion, *id.* at 22-25, decimation (executing every tenth offender but not informing the other condemned persons if they were to be put to death until the fatal shot was fired), *id.* at 25-26, dichotomy (bisecting), *id.* at 26, dismemberment, *id.* at 26-27, drowning, *id.* at 27-28, exposure to wild beasts, *id.* at 28, flaying alive (skinning alive), *id.* at 29, flogging or knout, *id.* at 29-30, garrote (placing a cord about the offender's neck and twisting it with a stick

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until strangulation is achieved), *id.* at 30, guillotine, *id.* at 30-33, hanging, *id.* at 33-38, hari kari, *id.* at 38, impalement, *id.* at 38-39, iron maiden (involving a statue of the Virgin Mary from which knives sprang forth), *id.* at 39, peine fore et dure (placing a heavy weight on the chest to restrict breathing), *id.* at 39-40, poisoning, *id.* at 40, pounding in mortar, *id.*, precipitation (throwing from a high point), *id.*, pressing to death, *id.* at 40-41, rack, *id.* at 41, running the gauntlet (forcing the condemned to run between rows of soldiers who each deliver blows), *id.* at 41-42, shooting, *id.* at 42-44, stabbing, *id.* at 44, stoning, *id.* at 44-45, strangling, *id.* at 45-47, and suffocation, *id.* at 47.

FN88. See Thomas P. Hughes, Harold P. Brown and the Executioner's Current: An Incident in the AC-DC Controversy, 32 HARV.BUS.REV. 143, 143 (1958) [hereinafter Hughes, Executioner's Current]. See generally THOMAS P. HUGHES, AMERICAN GENESIS: A CENTURY OF INVENTION AND TECHNOLOGICAL ENTHUSIASM, 1870-1970, at 13-52 (1989) [hereinafter HUGHES, AMERICAN GENESIS] (examining the century of "technological enthusiasm" in the United States); THOMAS P. HUGHES, NETWORKS OF POWER: ELECTRIFICATION IN WESTERN SOCIETY, 1880-1930, at 1-17 (1983) [hereinafter HUGHES, NETWORKS OF POWER] (documenting the advent and growth of electric power systems in the United States, Germany, and England); DAVID E. NYE, ELECTRIFYING AMERICA: SOCIAL MEANINGS OF A NEW TECHNOLOGY, 1880-1940 (1990) (analyzing electrification as a technology developed by its social context in U.S. society over a 60-year period); HAROLD C. PASSER, THE ELECTRICAL MANUFACTURERS, 1875-1900 (1953) (noting the changes the electrical industry brought forth in the late 19th and the 20th centuries).

FN89. See Hughes, Executioner's Current, *supra* note 88, at 143; Reynolds & Bernstein, *supra* note 85, at 19.

FN90. See Reynolds & Bernstein, *supra* note 85, at 19.

FN91. See Hughes, Executioner's Current, *supra* note 88, at 143; Reynolds & Bernstein, *supra* note 85, at 19.

FN92. The major advantage of alternating current was that it reduced copper costs, the most expensive feature of electrical power systems. Higher transmission voltages used with AC systems required thinner copper wire for transmitting power. See HUGHES, AMERICAN GENESIS, *supra* note 88, at 74; Reynolds & Bernstein, *supra* note 85, at 19.

FN93. See Hughes, Executioner's Current, *supra* note 88, at 143-45.

FN94. See *id.* The AC-DC controversy has been described in detail. See HUGHES, NETWORKS OF POWER, *supra* note 88, at 106-39; PASSER, *supra* note 88, at 78-150; Terry S. Reynolds & Theodore Bernstein, The Damnable Alternating Current, 64 PROC.INST.ELECT. & ELECTRONICS ENGINEERS 1339, 1339-43 (1976).

FN95. See Theodore Bernstein, "A Grand Success": The First Legal Electrocution Was Fraught with Controversy Which Flared Between Edison and Westinghouse, 10 IEEE SPECTRUM 54, 54-55 (1973).

FN96. *Id.* at 57.

FN97. See Kemmler II Transcript, *supra* note 37, at 345-47 (testimony of Elbridge T. Gerry).

FN98. Roger Neustadter, The "Deadly Current": The Death Penalty in the Industrial Age, J. AM. CULTURE, Fall 1989, at 79, 80-81.

FN99. *Id.*

FN100. See COMMISSION REPORT, *supra* note 84, at 77-80. The experiments conducted by Dr. Fell showed that upon application of electricity to dogs, the heart ceases to function and no resuscitation is possible. *Id.* at 77. The experiments also appeared to indicate that if the electricity is applied to the brain and nervous system, it causes "instantaneous death of the animal." *Id.*

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FN101. See *infra* notes 146-47 and accompanying text.

FN102. Letter from A.P. Southwick to Thomas Edison (Nov. 8, 1887) (on file with the Edison Archives, Edison National Historic Site, West Orange, N.J.).

FN103. HUGHES, *AMERICAN GENESIS*, *supra* note 88, at 32.

FN104. See generally BURTON J. BLEDSTEIN, *THE CULTURE OF PROFESSIONALISM: THE MIDDLE CLASS AND THE DEVELOPMENT OF HIGHER EDUCATION IN AMERICA* (1976).

FN105. Edison made clear his opinion that capital punishment should be abolished in his introductory comments on the Kemmler execution in which he mentions corresponding "to a man" (i.e., Southwick) in December 1887. See Mr. Edison on the Kemmler Execution, 16 *ELECTRICAL WORLD* 105, 105 (1890).

FN106. Letter from A.P. Southwick to Thomas Edison (Dec. 5, 1887) (on file with the Edison Archives, Edison National Historic Site, West Orange, N.J.). Edison's reply to Southwick's November 8 letter, see *supra* note 102, could not be located although its contents can be determined from Southwick's December 5 letter. Reynolds & Bernstein, *supra* note 85, at 27 n. 7.

FN107. See Reynolds & Bernstein, *supra* note 85, at 20.

FN108. See *id.* It appears that Edison's attitude toward Westinghouse may have been fueled by other conflicts between them. For example, Edison believed Westinghouse was among a number of commercial lighting companies that freely used his patents. See *id.* For this reason, in December 1886 Edison filed a number of lawsuits against Westinghouse for patent infringement. See, e.g., *Edison v. Westinghouse*, 9 *ELECTRICAL WORLD* 7, 7-8 (1887).

FN109. Letter from Thomas Edison to A.P. Southwick (Dec. 9, 1887) (on file with the Edison Archives, Edison National Historic Site, West Orange, N.J.). Edison would later confirm his views. See COMMISSION REPORT, *supra* note 84, at 76-77; see also Kemmler II Transcript, *supra* note 37, at 630-36. According to Edison, a 1,000 volt shock of AC would produce instant death in every case with little or no burning. His opinion was based upon experiments with a variety of animals and resistance tests on humans. See *id.* at 630-31.

FN110. See Kemmler II Transcript, *supra* note 37, at 372 (testimony of Elbridge T. Gerry); see also Gerry, *supra* note 79, at 321-25. According to Gerry, hanging, "while not unusual, may be, and too often is, cruel. Electricity, on the other hand, while not yet usual, has yet to be proven cruel; and as death whenever produced by it is instantaneous, it is difficult to see how it can be shown to be cruel." *Id.* at 324.

FN111. COMMISSION REPORT, *supra* note 84, at 81.

FN112. *Id.*

FN113. Kemmler II Transcript, *supra* note 37, at 369-70. This circular read as follows: The Legislature of the State of New York in 1886 ... appointed the undersigned, a Commission to investigate and report, at an early date, the most humane and practical method known to modern science of carrying into effect the sentence of death in capital cases. It is believed that your views on the subject will materially aid the Commission in the discharge of their important work.... First. Do you consider the present mode of inflicting capital punishment, by hanging, objectionable? ... Second. Were you ever present at an execution, and, if so, will you kindly state details of the occurrence bearing on the subject? Third. In your opinion, is there any method known to science which would carry into effect the death penalty in capital cases, in a more humane and practical manner than the present one of hanging? If so, what would you suggest? Fourth. The following substitutes for hanging have been suggested to the Commission. What are your views as to each? 1. Electricity. 2. Prussic Acid, or other poison. 3. The Guillotine. 4. The Garrote. Fifth. If a less painful method of execution than the present should be adopted, would any legal provision as to the disposition of the

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body of the executed criminal, be expedient in your judgment, in order that the deterrent effect of capital punishment might not be lessened by change? *Id.*, app. at lxxv-lxxvi.

FN114. *Kemmler II Transcript*, supra note 37, at 369-70 (testimony of Elbridge T. Gerry). These figures varied slightly in the Commission Report. See COMMISSION REPORT, supra note 84, at 81-83 (citing 87 as favoring electricity). The Justices of the Supreme Court were split between hanging and electricity. Their objections to electricity primarily concerned the uncertain effects it had on the human body. *Id.*

FN115. See *Kemmler II Transcript*, supra note 37, at 366-68 (testimony of Elbridge T. Gerry).

FN116. James W. Garner, *Infliction of the Death Penalty by Electricity*, 1 J.CRIM.L. & CRIMINOLOGY 626, 626 (1910).

FN117. See COMMISSION REPORT, supra note 84, at 80.

FN118. 1888 N.Y.LAWS ch. 489 (amending the previous method of inflicting the death penalty under the Code of Criminal Procedure).

FN119. *Id.* §§ 12, 505.

FN120. *Id.*

FN121. See HAROLD P. BROWN, *THE COMPARATIVE DANGER TO LIFE OF THE ALTERNATING AND CONTINUOUS ELECTRICAL CURRENTS* (3d ed. 1889), reprinted in *Kemmler II Transcript*, supra note 37, app. at xxii-xxiii, lxiv-lxvi; see also *Kemmler II Transcript*, supra note 37, at 34-36 (testimony of Harold P. Brown).

FN122. See *Reynolds & Bernstein*, supra note 85, at 19.

FN123. See *Hughes, Executioner's Current*, supra note 88, at 145.

FN124. Harold P. Brown, *Death in the Wires*, N.Y. EVENING POST, June 5, 1888 (letter to the Editor), reprinted in *The Admission of Alternating Currents into New York City*, 12 ELECTRICAL WORLD 40 (1888). See generally BROWN, supra note 121 (discussing the dangers of electrical currents generally).

FN125. See, e.g., *The Admission of Alternating Currents*, supra note 124, at 41-42 (reprinting letters condemning Brown's assertions); Harold P. Brown, *The New Instrument of Execution*, 149 N.AM.REV. 586, 586-87 (1889).

FN126. See Brown, supra note 125, at 586.

FN127. See *Kemmler II Transcript*, supra note 37, at 29 (testimony of Harold P. Brown); BROWN, supra note 121, at xiii; Brown, supra note 125, at 586.

FN128. Kennelly, an electrical engineer whom Edison described as his "walking" set of "tables," assisted Edison from 1887 to 1894. Later Kennelly became a professor at Harvard and then at the Massachusetts Institute of Technology. See *Hughes, Executioner's Current*, supra note 88, at 147 n. 17.

FN129. BROWN, supra note 121, at xiii.

FN130. *Id.* at xiv. The audience for Brown's demonstrations included members of the Board of Electrical Control, representatives of the press, and individuals interested in the electrical industry. *Id.* Thomas Edison was also invited. See *Invitation from Harold P. Brown to Thomas A. Edison* (no date) (on file with the Edison Archives, Edison National Historic Site, West Orange, N.J.).

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FN131. Dr. Peterson, a physician, had studied medical electricity abroad and had been applying electricity daily to patients for four years in the course of his medical practice. See Hughes, Executioner's Current, supra note 88, at 148 n. 21.

FN132. See BROWN, supra note 121, at xiv (summarizing a discussion of the experiments). At the demonstration, Brown and Peterson also read papers. See Harold P. Brown, On the Danger of Alternating Currents, and Frederick Peterson, Report of Experiments Showing the Effect of Continuous and Alternating Current on Living Animals, in Physiological Tests with the Electric Currents, 12 ELECTRICAL WORLD 69, 69-72 (1888).

FN133. See Hughes, Executioner's Current, supra note 88, at 149.

FN134. BROWN, supra note 121, at xv-xvi. An additional reason Brown conducted this experiment so quickly was to avoid possible interference by the SPCA because so many witnesses were repelled by the cruelty. Hughes, Executioner's Current, supra note 88, at 149.

FN135. Reynolds & Bernstein, supra note 85, at 22.

FN136. For a description of these experiments, see BROWN, supra note 121, at xxiii-xxiv, lxiv-lxvii; Harold P. Brown, Death-Current Experiments at the Edison Laboratory, 12 ELECTRICAL WORLD 312, 312-13 (1888) [hereinafter Brown, Death-Current]; Kemmler II Transcript, supra note 37, at 34-36 (testimony of Harold P. Brown).

FN137. Brown, Death-Current, supra note 136, at 312.

FN138. Report of the Committee of the Medico-Legal Society on the Best Method of Execution of Criminals by Electricity (presented to the Medico-Legal Society Dec. 12, 1888) [hereinafter Medico-Legal Society Report]; see also BROWN, supra note 121, at xix-xxiv (reprinting the Medico-Legal Society Report, supra); The Execution of Criminals by Electricity, 12 ELECTRICAL WORLD 324, 324 (1888) (excerpting the Medico-Legal Society Report, supra). An earlier report by the committee recommended that "[e]ither a continuous or an alternating current may be used, but preferably the latter." A Report on Execution by Electricity, 12 ELECTRICAL WORLD 275, 276 (1888). The final report mentioned only AC. See Medico-Legal Society Report, supra.

FN139. Clark Bell, Electricity and the Death Penalty, 10 JAMA 325, 329 (1889) (reprinting the report).

FN140. See Hughes, Executioner's Current, supra note 88, at 152.

FN141. George Westinghouse, Jr., Electric Lighting--Alternating vs. Direct Currents, N.Y. EVENING POST, Dec. 10, 1888 (letter to the Editor), reprinted in BROWN, supra note 121, at xxiv-xxvii. Indeed, six months later the Utica Saturday Globe described the case of H.M. Stevens of Boston who, in 1885, had been exposed to 1,500 volts of electricity by accident. Although he showed no signs of life, his flesh was cold and his arms were rigid, he revived paralyzed and in pain about an hour after being placed on a damp floor. A few weeks later he fully recovered. Death by Electricity, UTICA SATURDAY GLOBE, June 22, 1889, at 6.

FN142. Hughes, Executioner's Current, supra note 88, at 154-55.

FN143. Id. at 156. The prisons were Auburn, Sing Sing, and Clinton. Id.

FN144. See Death Current Experiments by the New York State Authorities, 13 ELECTRICAL WORLD 176, 176 (1889).

FN145. Because Westinghouse was attempting to prevent the use of his generators for electrocution, he was not willing to sell his equipment to Brown, who was not sufficiently wealthy to purchase it anyway. As a result, it appears that the Thomson-Houston Company and the Edison General Electric Company located three used Westinghouse generators

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and provided the necessary funds to Brown to purchase them. See Reynolds & Bernstein, supra note 85, at 22.

FN146. Compare Reynolds & Bernstein, supra note 85, at 22 (stating that the first designers were two physicians, Dr. Carlos MacDonald and Dr. A.D. Rockwell) with Dr. Rockwell 92 Years Old, N.Y. TIMES, May 19, 1932, at 15 (stating that Dr. A.D. Rockwell, Thomas A. Edison and "one other evolved the present system of electro-execution") and Bernstein, supra note 95, at 56 (stating that Dr. George E. Fell was the first designer) and George E. Fell, The Influence of Electricity on Protoplasm, with Some Remarks on the Kemmler Execution, 12 PHYSICIAN & SURGEON 433, 442-45 (1890) (describing his design of Kemmler's electric chair and noting that the Harold P. Brown chair was ill-suited for the purpose of electrocution).

FN147. See Fell, supra note 146, at 442-45.

FN148. Kemmler was born in Philadelphia in May 1860. Albert M. Dickinson, Next Week He Dies!, UTICA SATURDAY GLOBE, Aug. 2, 1890, at 1. Never exposed to education or religion, he was described as "a fair sample of street gamin from infancy through childhood." Id. At age 17 he went to work in Lamaisville, Pennsylvania, but later returned to Philadelphia where he earned a meager income as a fruit peddler. Id. At this point "[h]e became a heavy drinker and brawler and his intellect grew more dense than mere ignorance had left it." Id.

FN149. Kemmler II, 7 N.Y.S. 145, 146 (Cayuga County Ct. 1889).

FN150. When Kemmler was living in Philadelphia, he married Ida Porter but left her when he discovered she had another husband living. See Dickinson, supra note 148, at 1. Thereafter he convinced Matilda ("Tillie") Ziegler, the wife of his closest friend, to go to Buffalo where the two lived in "constant turmoil," drinking heavily and quarreling. Id. One newspaper described the pair as "dissolute, ignorant and ugly." Kemmler's Appeal Denied, N.Y. TIMES, May 24, 1890, at 9.

FN151. Kemmler II Transcript, supra note 37, at 1029, 1042-43.

FN152. Kemmler II Transcript, supra note 37, at 1036 (grand jury's indictment of Kemmler).

FN153. See BERKSON, supra note 83, at 23.

FN154. See id.

FN155. See Kemmler II Transcript, supra note 37, at 1042-44 (Ex. B).

FN156. The Last of Kemmler, UTICA SATURDAY GLOBE, Aug. 9, 1890, at 1, 4.

FN157. Leyden, supra note 26, at D5.

FN158. Reynolds & Bernstein, supra note 85, at 23.

FN159. Far Worse Than Hanging, supra note 20, at 2.

FN160. See Kemmler II, 7 N.Y.S. 145, 145 (Cayuga County Ct. 1889).

FN161. See id. at 146.

FN162. Id. at 148.

FN163. See Kemmler II Transcript, supra note 37, at iii-vii.

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FN164. See *id.*

FN165. See *id.*

FN166. See Hughes, Executioner's Current, *supra* note 88, at 158-59.

FN167. See Kemmler II Transcript, *supra* note 37, at 2-6.

FN168. *Id.* at 3-4.

FN169. *Id.* at 7.

FN170. *Id.* at 2.

FN171. *Id.* at 3-4.

FN172. *Id.* at 4-6.

FN173. *Id.* at 6.

FN174. *Id.* at 10.

FN175. *Id.* at 23.

FN176. *Id.* at 110 (testimony of Franklin L. Pope).

FN177. *Id.* at 117-18.

FN178. *Id.* at 152 (testimony of Daniel L. Gibbens).

FN179. *Id.* at 153.

FN180. See, e.g., *id.* at 398-425 (testimony of Landon Carter Gray, a physician and professor of nervous and mental diseases); *id.* at 425-27 (testimony of Bernhard Sachs, a physician and professor of nervous and mental diseases); *id.* at 569-81 (testimony of Alfonso D. Rockwell, a physician and surgeon who specialized in nervous diseases and electro-therapeutics).

FN181. See *id.* at 636-54.

FN182. Reynolds & Bernstein, *supra* note 85, at 23.

FN183. *Id.* at 23 (citations omitted).

FN184. See *id.* at 24 (citing newspaper reports at the time commending Edison's testimony).

FN185. See Kemmler II, 7 N.Y.S. 145, 151 (Cayuga County Ct.1889). Kemmler relied on experiments conducted in the United States and Great Britain demonstrating that electric current did not automatically kill the animals tested. In one experiment described by James Berry, a 19th century British hangman, the current failed to kill either a calf or an old dog: Two animals were obtained that had to be killed in any case, namely, a calf and an old dog of a large breed. In the case of the calf the connections were made ... and the current was turned on. This was repeated twice, but the only result was to cause the calf to drop on its knees and bellow with fear and pain, and the butcher at once killed it.... When the shock was applied to the dog he fell down and seemed to be paralyzed, but it was some time before life was

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extinct. JAMES BERRY, MY EXPERIENCES AS AN EXECUTIONER 55 (H. Snowden Ward ed., 1972) (1892).

FN186. Id. at 148.

FN187. Id.

FN188. Id.

FN189. Id.

FN190. Id. The court also dismissed the significance of the AC-DC controversy, explaining that: the question is not whether any particular engine provided or to be provided for use in the attempted enforcement of the law will prove successful in operation, whether the [direct] or alternating current is better for the purpose, or whether any certain quantity or force of electricity will kill the condemned, except as that force or quantity is limited by ability to generate it. Id.

FN191. Id. at 149.

FN192. Id.

FN193. See id.

FN194. Id.

FN195. Id.

FN196. See id.

FN197. Id.

FN198. See id. at 149-50.

FN199. 99 U.S. 130 (1878).

FN200. Id. at 135-37. In Wilkerson, however, the Court never reviewed evidence on the cruelty of shooting. Nor was the issue ever raised by the plaintiff who was protesting the application of a Utah statute authorizing the death penalty for first degree murder. The plaintiff had claimed that because no particular method of execution was specified in the statute, the lower court was not authorized to pass a sentence of death designating that the plaintiff be publicly shot. See id. at 131-32.

FN201. Kemmler II, 7 N.Y.S. 145, 150 (Cayuga County Ct.1889) (citing 4 WILLIAM BLACKSTONE, COMMENTARIES *406).

FN202. Id.

FN203. Id.

FN204. Id. at 151.

FN205. Id.

FN206. Id.